Risk and responsivity in forensic patients with ADHD

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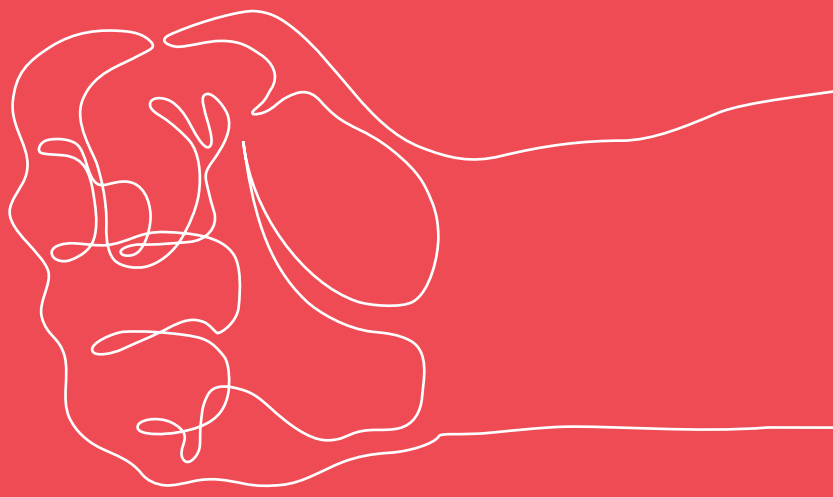
Identifying (inter)personal challenges in diminishing problem behavior and enhancing support



JENNY A.B.M. HOUTEPEN

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Jenny A. B. M. Houtepen

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Risk and Responsivity in Forensic Patients with ADHD:

Identifying (inter)personal challenges in diminishing problem behavior and enhancing support

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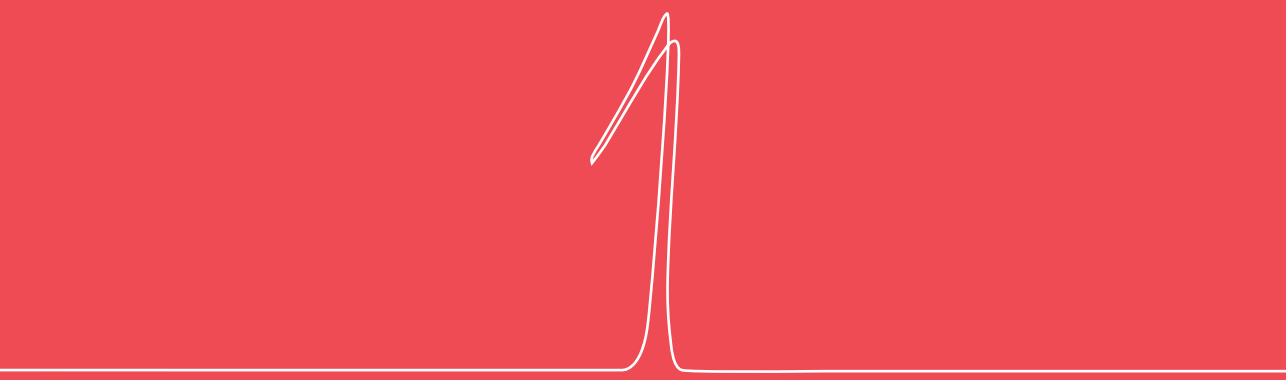
Chapter 1

General introduction



1.1 GENERAL INTRODUCTION

Attention-Deficit Hyperactivity Disorder (ADHD) is a pervasive neurodevelopmental disorder (American Psychiatric Association [APA], 2013), that persists into adulthood in the majority of patients (Faraone, Biederman, & Mick, 2006). Its worldwide prevalence is estimated to be approximately 3-5% in children (Polanczyk, Salum, Sugaya, Caye, & Rohde, 2015; Sayal, Prasad, Daley, Ford, & Coghill, 2018), and to vary between 2-5% in adults from the general population (e.g., Ramos-Quiroga, Nasillo, Fernández-Aranda, & Casas, 2014). Core symptoms can cause severe psychosocial problems (Davidson, 2008), including occupational, financial, and social problems (Antshel & Barkley, 2009; Barkley, Fisher, Smallish, & Fletsher, 2006; Uchida, Spencer, Faraone, & Biederman, 2018). Moreover, there is a strong link between ADHD and offending. Compared to the general population, prevalence rates of ADHD are five to ten times higher in forensic populations (Baggio et al., 2018; Young, Moss, Sedgewick, Fridman, & Hodgkins, 2015).

This increased risk in forensic populations has mostly been explained by personal factors, such as core ADHD symptoms (e.g., Philipp-Wiegmann et al., 2018), and common co-occurring externalizing disorders, such as conduct disorder and antisocial personality disorder (Retz & Rösler, 2009). Furthermore, risk factors related to core symptoms (e.g., impulsivity), comorbidity, and psychosocial problems can be expected to interact throughout patients' lives, hereby further impairing (inter)personal functioning, and subsequently, risk for offending too. The interrelatedness of these factors is reflected mainly in the high problem severity reported in adult offenders with ADHD (Kuzmickaitė, Leskauskas, & Gylytė, 2019; Young & Cocallis, 2019). Yet, a deeper understanding of how these factors contribute to risk and resilience in forensic patients suffering from ADHD is still lacking. In particular, more knowledge on the role of interpersonal risk and protective factors is warranted.

Treatment guidelines for adults with ADHD and co-occurring problems recommend multimodal treatment (e.g., including pharmacotherapy, psychoeducation, cognitive behavioral therapy, and coaching) to deal with the variety of problem behaviors in adult patients (Kooij et al., 2010). Yet, effectiveness of such programs has hardly been examined and evidence-based psychological treatment for ADHD and offending is scarce. To our knowledge, one forensic treatment program has been developed for patients with ADHD (Young & Cocallis, 2019; Young & Goodwin, 2010), of which its effectiveness has only been tested in non-forensic samples (Emilsson et al., 2011; Young et al., 2017). In addition, very recently, the effectiveness of another program focusing on ADHD treatment (including medication, psychoeducation and counseling) within treatment of intimate partner violence was examined in forensic outpatients with ADHD (Buitelaar, Posthumus, Bijlenga, & Buitelaar, 2019). Results showed that fewer ADHD symptoms were associated with decreases in this offending behavior in patients. Finally, in the outpatient center in which the research of this dissertation was conducted, a specialized treatment program for adult

ADHD and offending has also been initiated. The effectiveness of this program has not been empirically investigated yet.

The scarce knowledge regarding treatment for adults with ADHD can in part be attributed to the only recent acknowledgment that ADHD can persist into adulthood. The first papers on adult ADHD emerged in the late 1960s, and more widespread clinical recognition came around 30 years later (Barkley, Murphy, & Fischer, 2008). Knowledge on adult ADHD is thus relatively scarce (Katzman, Bilkey, Chokka, Fallu, & Klasse, 2017; Ramos-Quiroga et al., 2014). Moreover, the variety of problem behaviors associated with ADHD, and offending behavior in general may further explain the scarce knowledge about forensic patients suffering from ADHD. Challenges in providing treatment to 'difficult' patient samples, can also challenge conducting research in these patients (Paige & Mansell, 2013), resulting in high attrition rates among patients with severe psychosocial and behavioral problems (e.g., Rich et al., 2014). Although previous studies on treatment for ADHD report high drop-out rates in patients (e.g., Buitelaar et al., 2019; Rich et al., 2014; Young et al., 2017), few studies have investigated risk factors for poor treatment and research compliance in forensic patients with ADHD.

The aim of this dissertation is therefore twofold. First, we aim to provide more insight into risk and protective factors for offending in individuals with ADHD or related regulatory problems. We investigate the role of interpersonal factors, such as attachment and social support in relationship to externalizing behaviors in adult forensic patients with ADHD, and examine associations between poor self-control and perceived parenting on psychopathological problems in a sample of healthy adolescents. This way, we provide more understanding of how interpersonal factors can enhance or diminish problem behavior in persons with poor self-regulating skills. The second aim of this dissertation is to provide more insight into risk and protective factors for treatment and research compliance in adult forensic patients with ADHD. We investigate personal and interpersonal factors that are expected to contribute to poor compliance in forensic patients with ADHD. Moreover, we focus on which factors should be targeted in therapy to enhance responsivity, and ultimately, to diminish problem behaviors and enhance well-being in (forensic) patients with ADHD.

In this chapter, we first discuss the Risk-Need-Responsivity model for forensic psychiatric treatment, on which our research is based. Next, we discuss the current state of knowledge regarding risk factors for offending in adult ADHD, and elaborate on how these might impact patients' treatment and research compliance. Finally, we provide an overview of the studies we conducted to fulfill our research aims.

Theoretical framework: Risk-Need-Responsivity in Forensic Psychiatry

The Risk-Need-Responsivity (RNR; Andrews, Bonta, & Hoge, 1990) model is one of the most used rehabilitation models in forensic psychiatry. It includes three principles that offer guidelines for effective offender treatment. The *risk* principle suggests that

treatment intensity should be matched to the level of risk of reoffending. More intensive and/or longer treatment should be given to patients with higher risk for (re)offending. The *need* principle further states that treatment should be targeted at patients' criminogenic needs (also referred to as dynamic risk factors), i.e., risk factors which are often directly associated with a higher risk of (re)offending that are reversible and can be changed through treatment. This is in contrast to static risk factors, such as previous history of offending, which are fixed factors within patients' histories, and thus cannot be changed in therapy. These first two principles of the RNR model are related to the risk of reoffending, and influence each other mutually. That is, high (recidivism) risk offenders usually have more (severe) criminogenic needs that should be targeted in treatment (Bonta & Andrews, 2007). The third principle is more concerned with providing treatment in general. In particular, the *responsivity* principle explains *how* treatment should be provided to individual patients to be effective. This principle constitutes 'general responsivity', which refers to the idea that cognitive social learning interventions are most effective in changing behavior. According to this model, interventions are considered appropriate for all individuals when they are provided through warm, mutually respectful, and collaborative relationships (i.e., therapeutic alliance), that include effective structuring principles such as appropriate modeling, problem-solving, and reinforcement of behavior. Additionally, the responsivity principle includes 'specific responsivity', which suggests that treatment should match patients' individual strengths and weaknesses (Bonta & Andrews, 2007). These strengths and weaknesses can both facilitate and hinder treatment progress. Therefore, identification of such responsivity factors seems key to enhance treatment success: i.e., which of course, does not only include the lowering of patients' risk for (re)offending, but also the enhancement of patients' general well-being (e.g., see Ward (2002) for a detailed explanation on integrating the risk management perspective of the RNR model with a strength-based approach such as the Good Lives Model in treatment of forensic patients). Further, we will discuss how core symptoms of ADHD and associated personal and interpersonal factors are related to these three main principles in forensic rehabilitation and research.

Personal risk and responsivity

Core symptoms

According to the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013), ADHD comprises of three core symptoms: attention deficits, and/or hyperactivity and impulsivity; depending on subtype. Attention deficits include symptoms such as lacking attention to details/making careless mistakes, having difficulty following through on instructions, or organizing tasks and activities, and being distracted easily. Hyperactivity includes for example fidgetiness, a tendency to always be "on the go", and feelings of restlessness (more often applicable to adults than to children). Finally, impulsivity includes for example interrupting and intruding on others, blurting out answers

before questions have been completed, and having difficulty with waiting your turn. To qualify for an ADHD diagnosis, children have to meet at least 6 out of the in total 9 symptoms of inattention, and/or 6 out of the 9 symptoms of hyperactivity/impulsivity. For adults, 5 symptoms have to be applicable. Additionally, several of the symptoms should be present before the age of 12, and, symptoms should be apparent in, and interfere with at least two domains of functioning (school/occupational, social, and personal [e.g., affecting self-image]). Finally, symptoms should not only have occurred during the course of a psychotic disorder, and are not better explained by other mental disorders (APA, 2013).

From the perspective of the RNR model there is convincing evidence that having ADHD is associated with earlier age of onset, and increased (re)offending rates (Mohr-Jensen & Steinhausen, 2016; Philipp-Wiegmann et al., 2018). In general, offenders with ADHD can thus be considered high risk offenders. In particular, symptoms of hyperactivity/impulsivity are expected to contribute to the increased risk of offending in patients with ADHD (e.g., Young, 2007). However, the direct contribution of ADHD core symptoms to this increased risk are hard to disentangle, because of comorbid externalizing disorders that are associated with high offending risk (Storebø & Simonsen, 2016; Young & Cocallis, 2019).

Regarding patients' responsivity to treatment, research on pharmacological treatment has indicated that core symptoms of attention deficits (e.g., forgetfulness and disorganization) and impulsivity can challenge medication adherence in adults with ADHD (Safren, Duran, Yovel, Perlman, & Sprich, 2007). Treatment with stimulants often requires that patients consequently administer medication two or three times a day, according to a strict time schedule for a very long period. This can be highly challenging for patients with ADHD (Swanson, 2003). Moreover, it has been suggested previously that appointment keeping in psychological treatment is challenging for forensic adult patients with ADHD (Woicik, Van der Lem, Sijtsema, & Bogaerts, 2017), resulting in high no-show rates during treatment. Yet, in this study, ADHD symptoms were not directly associated with no-show rates, which was explained by arguing that symptom severity was not investigated using systematic research instruments. Therefore, in the current dissertation, we further examine the role of patients' psychopathological symptoms on no-show rates using such instruments in forensic outpatients with ADHD (Chapter 5). Moreover, we investigate symptoms underlying cognitive-motivational deficits associated with ADHD. Insights into the association between cognitive-motivational deficits and treatment compliance may explain why patients with ADHD have difficulties with appointment planning, showing up, and treatment adherence.

Cognitive-motivational functioning in ADHD

ADHD symptoms are expected to result from multiple related, but distinct neuropsychological pathways implicated in the execution of higher-order cognitive, and motivational processes (Sonuga-Barke, 2003). Within these neuropsychological pathways, variance in response inhibition deficits (Barkley, 1997), and motivational deficits

characterized by an increased sensitivity for immediate rewards (Sonuga-Barke, 2003), are among the most important deficits associated with patient diversity in ADHD symptoms (Ma, Van Duijvenvoorde, & Scheres, 2016; Sonuga-Barke, Sergeant, Nigg, & Willcutt, 2008). Impulsivity resulting from response inhibition deficits in ADHD, is considered to result from problems with suppressing or interrupting (inappropriate) dominant behavioral responses (Barkley, 1997). Response inhibition is a component of executive functioning, which includes a set of complex, higher-order cognitive processes that are needed to execute goal-directed behavior, to meet future goals (e.g., Pennington & Ozonoff, 1996). According to Barkley (1997), response inhibition deficits in ADHD lead to other executive functioning problems too, such as problems with self-regulation of emotion, and difficulties in planning. In contrast, motivational deficits associated with ADHD are considered to drive impulsivity on a cognitive and emotional level characterized by a need for immediate gratification. Hence, patients with ADHD are expected to make impulsive choices, because they discount the value of future rewards (i.e., temporal reward discounting; Jackson & Mackillop, 2016), or behave impulsively, because they feel stressed when waiting for future rewards, and thus try to avoid delay (i.e., delay aversion; Sonuga-Barke, 2003).

Although there is clear evidence that patients with ADHD differ in the display of these cognitive-motivational deficits, far less is known about how this relates to functioning, particularly in adults. There is some support that response inhibition deficits are enhanced in offenders with ADHD, compared to non-offending controls with ADHD (Bramham & Giollabhui, 2016; Ginsberg, Hirvikoski, & Lindefors, 2010; Meier, Perrig, & Koenig, 2012). Furthermore, motivational problems have been associated with self-reported criminal behavior in a mixed sample of adults with ADHD and 'other' psychiatric patients (Thorell, Sjöwall, Mies, & Scheres, 2017). Cognitive-motivational problems might thus be more pronounced in forensic patients with ADHD. Moreover, regarding responsivity to treatment, it can be argued that these deficits affect patients' ability to adhere to forensic treatment, because these deficits may interfere with the ability to commit to longer-term goals. Following psychological treatment is likely to represent such a long-term commitment. Indeed, there is some support for associations between cognitive-motivational deficits and poorer treatment outcomes in other (forensic) psychiatric samples (Fishbein et al., 2009; Vergara-Moragues et al., 2017). In this dissertation, we will further examine whether these deficits are also related to measures of treatment and research compliance in forensic outpatients with ADHD (Chapter 6).

Comorbid disorders

Additional risk and responsivity factors in ADHD may include the presence of some highly common comorbid disorders. For children with ADHD, there is clear evidence that comorbid conduct disorder increases risk for later antisocial personality disorder, and offending in adulthood (e.g., Storebø & Simonsen, 2016). Also, comorbid substance use disorders are known risk factors for offending in patients with ADHD (Retz & Rösler,

2009). In adults with ADHD, the most commonly reported comorbidities are mood- and anxiety, substance use disorders, and (cluster B and C) personality disorders (e.g., Katzman et al., 2017; Sobanski, 2006). Other developmental disorders (autism spectrum disorders, in particular), and traumatic brain injuries, have for example also been reported (e.g., Franke et al., 2018; Hartman, Geurts, Franke, Buitelaar, & Rommelse, 2016). Although it is not really clear how all of these comorbid disorders contribute to patients' increased risk for offending, it seems that rates are elevated in forensic patients with ADHD (Ginsberg et al., 2010; Scully, Young, & Bramham, 2014; Young & Cocallis, 2019), resulting in a patient group with more complex treatment needs. Hence, regarding treatment responsivity, many of these disorders have previously been associated with treatment no-show and treatment drop-out in other patient samples, including (non-forensic) psychiatric and medical patients (e.g., Daggy et al., 2010; Fenger, Mortensen, Poulsen, & Lau, 2011; Matas, Staley, & Griffin, 1992; McMurran, Huband, & Overton, 2010). In this dissertation, we therefore examine associations between comorbid psychopathological factors and treatment and research compliance in forensic patients with ADHD (Chapter 5 and 6).

Interpersonal risk and responsivity

Finally, interpersonal factors are pivotal when explaining differential outcomes in functioning in patients with ADHD (Hechtman, 1991; Sonuga-Barke, Auerbach, Campbell, Daley, & Thompson, 2005; Taylor, 1999). To date, this association has been studied predominantly in children. In general, children with ADHD come from more stressful family environments than healthy controls (Cunningham & Boyle, 2002; DuPaul, McGoey, Eckert, & VanBrakle, 2001; Theule, Wiener, Tannock, & Jenkinks, 2014). Moreover, parents of children with ADHD made use of poorer parenting practices (McKee, Harvey, Danforth, Ulaszek, & Friedman, 2004; Shelton et al., 1998), and tended to be more controlling and disapproving, and less rewarding and responsive than parents of children without ADHD (Modesto-Lowe, Danfort, & Brooks, 2008). In adults with ADHD, interpersonal issues, including fewer friendships, more marital difficulties, and more family dysfunction, were more often reported compared to adults without ADHD (Eakin et al., 2004; Young, Toone, & Tyson, 2003). These interpersonal issues can disrupt the forming of secure attachment relationships (Bowlby, 1973), and may affect interpersonal and adaptive functioning throughout the lifespan. Indeed, higher levels of insecure attachment have previously been reported in both children and adults with ADHD (e.g., Storebø, Rasmussen, & Simonsen, 2016).

Unfortunately, little research has been conducted on how these interpersonal factors relate to increased risk for offending in patients with ADHD. There is increasing support that interpersonal problems contribute to the development of conduct disorder, and later antisocial personality disorder in adults with ADHD (Storebø & Simonsen, 2016), which in turn, thus enhances forensic risk. Moreover, in some of the most influential theories on offending, supportive relationships with others are considered key in protecting

individuals against offending (Bowlby, 1973; Cullen, 1994; Hirschi, 1969). In addition, from the perspective of the RNR model, poor family and marital relationships, as well as having strong connections with criminal others are considered major risk factors for (re) offending (e.g., Andrews & Bonta, 2006). In developmental research, it has been argued that these interpersonal factors (i.e., parenting, in particular) have a stronger influence on functioning, when individuals have difficulties with regulating their behavior themselves (e.g., Stice & Gonzales, 1998). This would then likely also be the case for individuals with ADHD. Yet, in other work it has been suggested that interpersonal factors, such as social support, cannot buffer against offending when numerous risk factors are present (e.g., Cusick, Havlicek, & Courtney, 2012).

It is thus a matter of debate to what extent interpersonal factors can enhance and (particularly) diminish problem behaviors in high-risk populations more generally. Notwithstanding this debate, patients with ADHD often have lifelong interpersonal problems and difficulties regulating their behavior. Therefore, patients with ADHD often have fewer individuals within their (informal) social networks who provide them with support. Poor social support may thus be an additional factor enhancing forensic risk in patients with ADHD. Moreover, attachment problems have been associated consistently with offending in other forensic and clinical samples (e.g., Ogilvie, Newman, Todd, & Peck, 2014). Previous studies further indicated that in children with ADHD, secure parent-child attachment may protect against comorbid internalizing and externalizing problems (Al-Yagon, Forte, & Avrahami, 2017), whereas in adults with ADHD, insecure attachment styles were associated with more comorbid psychopathology (Koemans, Van Vroehoven, Karreman, & Bekker, 2015). In the current dissertation, we therefore examine the extent to which insecure attachment and poor social support are related to increased risk for offending in forensic patients with ADHD (Chapter 3).

Moreover, we examine associations between these interpersonal factors and research and treatment compliance (Chapters 5 and 6). With regard to treatment responsivity, both insecure attachment and poor social support have been found previously to affect the way in which patients are able to profit from psychological treatment in other samples (e.g., Feitsma, Popping, & Jansen, 2012; Levy, Ellison, Scott, & Bernecker, 2011; Sung, Belenko, Feng, & Tabachnick, 2004). Evidently, in interacting with mental health professionals, it seems that patients should at least in part, be able to rely on (professional support from) others in order to profit from therapy. To date, these factors have not yet been examined in treatment of (forensic) patients with ADHD.

1.2 OUTLINE OF THIS DISSERTATION

In sum, patients with ADHD are at increased risk for offending. ADHD is a highly heterogeneous disorder in terms of the expression of core symptoms, comorbid diagnoses, and psychosocial impairment (Willcutt et al., 2012), with high problem severity usually

reported in forensic patients with ADHD (Young & Cocallis, 2019). These problems might further increase patients' risk for (re)offending and impact upon their responsivity for treatment too. To date, no studies have empirically tested these risk and responsivity factors in forensic patients with ADHD.

The **first aim** of this dissertation is to provide more insight into risk and protective factors for offending in ADHD, and the role of interpersonal factors in particular. To this end, in **Chapter 2**, we first examine the extent to which associations between poor self-control and psychopathological problems depend on perceived parenting in a sample of healthy adolescents. To conduct this study, we use data from the Study on Personality, Adjustment, Cognition, and Emotion II (SPACE II), which is a Dutch cohort study focusing on the psychosocial development of adolescents from the general population. Via adolescent self-reports (*N*=809), we investigate associations between effortful control, perceived parenting, and psychopathological problems. Additionally, we test whether associations differ between boys and girls. This way, we provide insight into the extent to which interpersonal factors can enhance or diminish problem behavior in individuals with poor self-control. Chapter 2 is the only chapter in which female participants are included.

To further address our research aims, in Chapter 3 to 6, we use data collected in two different samples of adult males with ADHD. All participants were receiving treatment for ADHD and offending in the same Dutch forensic outpatient center at time of their inclusion. In **Chapter 3,** we use a subsample of one of these patient samples to examine interpersonal risk factors for offending in forensic patients with ADHD. Specifically, in this chapter we test whether poor social support and attachment insecurity are associated with more self-reported externalizing behaviors. We compare self-reports of 32 forensic outpatients with ADHD with self-reports of a matched control group of healthy, and 'at risk' control males with (a history of) psychological problems from the general population. Additionally, we test associations between social support, attachment and externalizing behaviors within the sample as a whole, and examine whether these associations are more pronounced in forensic patients with ADHD.

The **second aim** of this dissertation is to examine risk and responsivity factors associated with treatment and research compliance in forensic patients with ADHD. To this end, we first identify challenges in doing research on difficult patient populations in previous research, and use this knowledge to increase the feasibility of the current study. This process is described in **Chapter 4.** In particular, we use a pilot and follow-up study on 52 forensic outpatients with ADHD and their social networks, to provide a practical case example on how previous recommendations were incorporated in the study design and to what extent these are feasible in studying patients in a forensic outpatient center.

In **Chapter 5** we focus specifically on patients' treatment responsivity. In this chapter, we examine relationships between ADHD symptom severity, self-reported comorbid psychopathological symptoms, and psychosocial functioning in relationship to treatment no-show. To conduct this study, we make use of self-report data from 60 adult forensic

patients with ADHD and retrieve patient file information on treatment no-shows retrospectively. In **Chapter 6**, we further investigate cognitive-motivational problems, comorbid externalizing problems, and interpersonal factors associated with ADHD symptoms and offending, in relationship to treatment and research compliance. For this study, we use a prospective research design to assess treatment compliance in the patient sample also described in Chapter 4.

Finally, in **Chapter 7** we will summarize the main findings of these studies, reflect on the strengths and weaknesses of this dissertation as a whole, and provide recommendations for clinical practice and future research.

This chapter is based upon: Houtepen, J.A.B.M., Sijtsema, J.J., Klimstra, T.A., Van der Lem, R., & Bogaerts, S. (2019). Loosening the reins or tightening them? Complex relationships between parenting, effortful control, and adolescent psychopathology. *Child and Youth Care Forum, 28*(1), 127-145. doi: 10.1007/s10566-018-9477-7

Chapter 2

Loosening the reins or tightening them? Complex relationships between parenting, effortful control, and adolescent psychopathology

ABSTRACT

Adolescents face major developmental tasks such as increasing individuation and establishing autonomy. These developmental tasks increase demands on adolescent self-control, hereby putting youth with poor effortful control at risk for psychopathology. Specific parenting behaviors might be warranted to buffer against this risk. Therefore, in this study we examined parenting-related risk and protective factors in the associations between effortful control and adolescent psychopathology. We hypothesized that youth with poor effortful control require more parental involvement (i.e., lower autonomy granting) to help complete these developmental tasks and subsequently avoid psychopathology. Via adolescent self-reports (N = 809), associations between effortful control, perceived parenting (i.e., psychological control and autonomy support), and externalizing (i.e., interpersonal aggression and rule-breaking) and internalizing problems (i.e., depressive and anxiety problems) were examined. Regression analyses supported our hypothesis in boys: higher levels of autonomy support exacerbated the negative association between effortful control and rule-breaking. In contrast, in girls this was the case for lower levels of autonomy support. For both genders, low autonomy support and psychological control exacerbated negative associations between effortful control and internalizing problems. No buffering effects of parenting were found. These results indicate that low effortful control is associated with psychopathology in adolescents, but that parenting can affect this association in several ways, depending on the type of psychopathology and the adolescent's gender. Future research should focus on finding 'optimal' levels of parental control that can help avoid psychopathological problems in youth with poor effortful control.

2.1 INTRODUCTION

Effortful control reflects the ability to voluntarily inhibit, activate, or change attention and behavior in response to the environment (Rothbart, 1989). It is implicated in effective emotion regulation and in adhering to socially appropriate standards (Eisenberg, Smith, & Spinrad, 2011). Higher levels of effortful control in youth are typically associated with better behavioral adjustment (Gardner, Dishion, & Connell, 2008), whereas lower levels are associated with externalizing and internalizing psychopathology, including aggression, rule-breaking, and mood and anxiety problems (Eisenberg et al., 2009; Finkenauer, Engels, & Baumeister, 2005; Oldehinkel, Hartman, De Winter, Veenstra, & Ormel, 2006). Psychopathology is more likely to occur in youth with poor effortful control. This risk further increases if youth also experience difficulties within their social context (Bates, Pettit, Dodge, & Ridge, 1998), such as problematic parenting. Previous research reported consistently that youth with low effortful control who also experience problematic parenting, are likely to show externalizing problems (e.g., Bates et al., 1998; Morris et al., 2002).

For internalizing problems, there is less research examining the contributions of interactions between effortful control and parenting, and results are mixed. Whereas some studies in children found ineffective parenting practices to be associated with more internalizing problems in children with low effortful control (Lengua, Wolchik, Sandler, & West, 2000), another study reported that the association between ineffective parenting and effortful control on internalizing problems is stronger for children with high effortful control (Van Leeuwen, Mervielde, Braet, & Bosmans, 2004). To our knowledge, there are no studies examining these interactions in association with internalizing problems in adolescents. This is surprising, because parental influences on the development of psychopathology likely differ for children and adolescents. Adolescence is marked by biological and social changes which can lower the impact of parental influences on adolescent emotion regulation (e.g., Graham, Scott, & Weems, 2017), and increase the need for self-control to avoid developmental difficulties. These changes put adolescents with poor effortful control at risk for both externalizing and internalizing psychopathology.

In addition, previous studies mainly focused on parenting-related risk factors for psychopathology, and therefore little is known about parenting-related protective factors buffering psychopathology in youth with poor effortful control (Rutter, 2001; Veenstra, Lindenberg, Oldehinkel, De Winter, & Ormel, 2006). In general, youths who are at risk for developing psychopathology are thought to be more affected by their parents' behavior, for better or worse, than youths without such risk factors (Belsky, Hsieh, & Crnic, 1998; Stice & Gonzales, 1998). Hence, it is important to examine both parenting-related risk and protective factors for psychopathology in adolescents with poor effortful control.

In the present study, we aim to gain more insight into both risk and protective factors of externalizing and internalizing psychopathology in adolescents with poor effortful control.

Associations between effortful control, parenting, and psychopathology are complex and likely depend on a number of factors, including type of psychopathology, parenting style, and gender differences in the display of psychopathology. Moreover, what may or may not be effective parenting likely depends on the developmental tasks adolescents are facing (Steinberg & Silk, 2002). Earlier studies often address only a few of these issues while examining psychopathology in youth with low effortful control. This may present an oversimplified picture of risk factors for psychopathology and may lead to mixed results. In this study, we address these issues by examining interactions between effortful control and different parenting styles in their associations with externalizing and internalizing psychopathology in adolescent boys and girls.

Developmental tasks in adolescence and parenting: Loosening the reins

During adolescence, youth face major normative developmental tasks such as increasing individuation, establishing autonomy, and seeking more independence from primary caregivers (Steinberg & Morris, 2001). This individuation process requires specific parenting behaviors that permit adolescents to develop their own opinions and beliefs (Koepke & Denissen, 2012; Steinberg & Silk, 2008). In previous research, these parenting behaviors are often operationalized alongside parent style dimensions (Soenens et al., 2004), of which parental autonomy support and psychological control are particularly important during adolescence.

Autonomy support refers to parents' promotion of children's independence- and volitional functioning (Soenens et al., 2007), and the degree to which parents let their children make independent decisions (Beyers & Goossens, 1999). Control by parents who provide autonomy support is thought to closely resemble executing behavioral control (Hauser-Kunz & Grych, 2013), such as discouraging independency by setting clear rules for children's behavior. In contrast, psychological control reflects intrusive and manipulative parental behavior, such as inducing feelings of guilt and shame in order to control children's behavior (Soenens et al., 2004). Both parenting styles are directly related to the extent to which parents assist children in fulfilling adolescent developmental tasks of gaining independency and autonomy. Higher levels of parental autonomy support are associated with positive psychosocial outcomes, such as feelings of social competence (Soenens & Vansteenkiste, 2005). In contrast, higher levels of psychological control may interfere with normative developmental tasks of mastering independence and emotional autonomy (Reitz, Dekovic, & Meijer, 2006), and have been associated with both externalizing and internalizing problems (e.g., Lansford, Laird, Pettit, Bates, & Dodge, 2014; Pettit, Laird, Dodge, Bates, & Criss, 2001).

Furthermore, lower levels of psychological control combined with higher levels of autonomy support reflect psychological autonomy granting (Steinberg, 2001). Psychological autonomy granting is the degree to which parents encourage and permit adolescents to develop their own opinions and beliefs. Higher levels of psychological autonomy granting

are thought to be associated with better psychosocial functioning in adolescents (Steinberg, 2001). In this respect, psychological autonomy granting is considered a general protective factor against adolescent psychopathology. Moreover, because psychological autonomy granting can enhance feelings of self-worth and competence in adolescents, it is also thought to protect against internalizing problems (Gray & Steinberg, 1999).

Adolescents with poor effortful control: Tightening the reins?

However, what is considered effective parenting for one adolescent is not necessarily effective for another (e.g., Belsky, 1997). Although psychological autonomy granting is generally associated with better psychosocial functioning in adolescence (Steinberg, 2001), higher levels of autonomy are also associated with adolescent psychopathology in some studies. For example, adolescent emotional autonomy (i.e., provided to adolescents through low levels of parental psychological control) was positively associated with internalizing problems, and behavioral autonomy (i.e., provided through higher levels of parental autonomy support) was associated with more rule-breaking behavior (Beyers & Goossens, 1999).

In part, these contrasting findings on autonomy and adolescent functioning may be explained by considering to what extent autonomy is mastered by a sense of volition instead of forced upon the adolescent through parenting (Van Petegem, Vansteenkiste, & Beyers, 2013). Yet, the extent to which psychological autonomy granting is beneficial to an adolescent also depends on whether adolescents are ready to successfully establish independency and autonomy, and the degree to which they are able to control their own behavior. For example, studies suggest that providing adolescents with behavioral autonomy when they are not yet ready, is associated with both externalizing and internalizing problems (Dishion, Nelson, & Bullock, 2004; Pavlova, Haase, & Silbereisen, 2011). This is more likely to be a problem for adolescents with poor effortful control, because for them it is more difficult to successfully complete developmental tasks. Specifically, the increased responsibility, independence, and freedom that is experienced during adolescence, places higher demands on adolescent self-control, which put adolescents with poor effortful control at an increased risk for psychopathology (Pérez-Edgar, 2015).

Therefore, it could be argued that for adolescents with low effortful control, the level of autonomy support that is needed to actively assist them in completing normative developmental tasks and subsequently avoid psychopathology is lower. Similarly, previous research on children indicated that for some children with poor self-regulation, higher levels of restrictive parental control (i.e., lower levels of psychological autonomy) are needed to diminish externalizing problems (Bates et al., 1998; Kiff, Lengua, & Zalewski, 2011). Hence, we expect lower levels of parental autonomy support, but not necessarily higher levels of psychological control, to be associated with better psychosocial outcomes in adolescents with poor effortful control. Parents who use psychological control employ manipulative tactics in order to make their children act or think according to their

standards (Barber & Harmon, 2002). Such parenting is less sensitive to the needs and interests of children (Soenens et al., 2007), and therefore is considered as a general risk factor for psychopathology, regardless of children's level of effortful control.

The current study

In sum, despite a wealth of studies focusing on interactions between effortful control and parenting in relation to psychopathology in youth, there is a lack of knowledge regarding internalizing problems and protective factors for psychopathology in general. A major challenge lies in determining what is considered effective parenting for youth with poor effortful control in relation to psychopathological problems, as this may depend on the specific developmental tasks that are being faced (Steinberg, 2001; Steinberg & Silk, 2002). Finally, the interaction between effortful control and parenting in relation to adolescent psychopathology may also depend on the gender of the adolescent. As noted earlier, studies indicated that youth who are more at risk for psychopathology are more affected by their parents' behaviors (Belsky et al., 1998; Stice & Gonzales, 1998). Parenting may thus have a stronger impact on boys' externalizing problems because boys are at more risk for developing these compared to girls (see also Veenstra et al., 2006). Similarly, for girls this may be the case for internalizing problems (see for example Graham & Weems, 2015).

In the present study, interactions between effortful control and parenting are examined in relation to adolescents' externalizing (i.e., interpersonal aggression and rule-breaking) and internalizing problems (i.e., depressive and anxiety problems). Although gaining behavioral and emotional autonomy is part of normative development, previous work showed that both are associated with internalizing and externalizing psychopathology in some adolescents (e.g., Dishion et al., 2004; Pavlova et al., 2011). Moreover, research indicates that children with poorer self-regulatory abilities sometimes need more parental involvement in order to lower psychopathological problems (e.g., Kiff et al., 2011). Based on these findings, we argue that youth with poor effortful control need more parental control in order to successfully cope with developmental tasks and avoid psychopathology. Hence, we hypothesize that negative associations between effortful control and externalizing and internalizing psychopathology are stronger in adolescents who perceive more parental psychological control and autonomy support (i.e., more psychological autonomy granting) (*hypothesis 1*). Moreover, we expect that lower levels of perceived psychological control and autonomy support (i.e., less psychological autonomy granting) mitigate the negative associations between effortful control and psychopathological problems (*hypothesis 2*). Finally, we hypothesize that the interaction between effortful control and parenting in relation to externalizing problems will be more pronounced for boys compared to girls, whereas we expect the inverse pattern (i.e., a stronger interaction effect between effortful control and parenting for girls) in relation to internalizing problems (*hypothesis 3*).

2.2 METHOD

Participants

Participants were 866 subjects (*M* age = 13.84 years, *SD* = 1.06, range 11 - 16) of the Study on Personality, Adjustment, Cognition, and Emotion II (SPACE II). SPACE II is a Dutch cohort study focusing on the psychosocial development of adolescents from the general population. Participants were recruited via four secondary schools, located in four medium- to large-sized cities in the Netherlands. In the Netherlands, secondary schools are often divided into low to moderate education levels (i.e., combinations of vocational training and theoretical education), and higher educational levels (i.e., preparatory tracks for professional education or university). In this study, almost all participants were enrolled in the higher education levels (93.3%). More than half of the sample was of Dutch nationality (64.5%). Other nationalities included Turkish (7.7%), Moroccan (6.6%), and Surinamese (5.3%).

Procedure

SPACE II was conducted in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) and approved by the local Institutional Review Board at the host university of the first author. Before initiating the study, school principals were asked for permission to collect data at their schools. Next, parents were notified about the nature of the study by information letters in which the purpose and procedure of the study was described. SPACE II uses a passive informed consent procedure for parents, which is common in the Netherlands. Details about the study were explained in the information letter, and parents were given the opportunity to object to their children's participation within two weeks after receipt of the information letter. Finally, adolescents were informed about the nature of the study and were asked whether they wanted to participate. Participants were able to withdraw from the study at any time, without having to provide a reason for this. In 2014, data collection took place during school hours, under the supervision of trained bachelor's and master's of psychology students.

Measures

Effortful control. Effortful control was measured using 16 items (α = .77) of the Early Adolescent Temperament Questionnaire – Revised (EATQ-R; Ellis & Rothbart, 2001). The EATQ-R contains various subscales assessing three main factors of children's temperament, including effortful control. Participants completed the questionnaire by indicating on a 5-point Likert-scale (i.e., *1 = almost never true* to *5 = almost always true*), how much they agreed with statements, such as: "If I have a hard assignment to do, I get started right away". Mean total effortful control scores were computed by averaging participants' scores on the 16 items. Previous studies have found support for the internal consistency and validity of the EATQ-R (Muris & Meesters, 2009).

Parenting. Parental psychological control and autonomy support as perceived by the adolescent were measured using the Leuven Adolescent Perceived Parenting Scale (LAPPS; Soenens et al., 2004). In this study, the subscale psychological control was assessed for mothers and fathers, separately (e.g., "My mother/father will avoid looking at me when I have disappointed her/him"). We averaged mother- and father-ratings in order to create one parental psychological control score for both parents (16 items; α = .90). Autonomy support was assessed for both parents together (e.g., "My parents let me choose my own direction, whenever that is possible") (5 items; α = .78). Adolescents indicated on a 5-point Likert scale ranging from 1 (*completely disagree)* to 5 (*Completely agree*) how much they agreed with the items. Higher mean total scores indicate higher adolescent perceived levels of that particular parenting style. The internal consistency and construct validity of the LAPPS have been supported in previous research (e.g., Beyers & Goossens, 2008; Soenens et al., 2004).

Externalizing psychopathology. Interpersonal aggression and rule-breaking behavior were measured using 27 items of the Antisocial Behavior Questionnaire (ASBQ), which is based on the Self-report Delinquency Scale (Moffit & Silva, 1988). The ASBQ consists of items that measure both engagement in interpersonal aggression (e.g., "How often did you engage in a physical fight?"; 10 items, α = .79), and engagement in rule-breaking behavior in the past 12 months (e.g., "How often have you stolen something from a store?"; 17 items, α = .88). Responses were rated on a 5-point scale as *0 = never, 1 = once, 2 = two or three times, 3 = four to six times,* and *4 = seven times or more*. Higher mean total scores indicate more use of interpersonal aggression and rule-breaking behavior. Previous research has shown that the ASBQ is a reliable instrument in terms of internal consistency and construct validity (Van der Laan, Veenstra, Bogaerts, Verhulst, & Ormel, 2010).

Internalizing psychopathology. Depressive problems were measured with the 12 item (α = .83) version of the Center for Epidemiologic Studies Depression Scale (CES-D-12-NLSCY; Poulin, Hand, & Boudreau, 2005; Radloff, 1977). The CES-D is designed to assess current levels of depressive symptoms in the general population. Respondents indicated on a 4-point scale (*1 = rarely or none of the time (less than 1 day), 2 = some or a little of the time (1 -2 days), 3= occasionally or a moderate amount of time (3 – 4 days), 4 = most or all of the time (5 – 7 days))* how often in the past week they experienced symptoms, such as "I had crying spells". Higher mean total scores indicate more depressive problems. The CES-D tends to have good internal consistency and construct validity (Radloff, 1977).

Anxiety problems were assessed using the generalized anxiety disorder subscale (5 items; α = .84) of the Screen for Child Anxiety Related Emotional Disorders - Revised (SCARED-R; Muris, Merckelback, Schmidt, & Mayer, 1999). Adolescents were asked to rate how often they had experienced each symptom (e.g., "I worry about being as good as other kids") on a 3-point scale (*0 = almost never, 1 = sometimes, 2 = often*). Higher scores are indicative of more generalized anxiety problems, and more generalized worrying and

rumination, specifically. The SCARED-R was found to be a reliable and valid instrument in previous research (Muris et al., 1999; Muris, Merkelbach, Van Brakel, Mayer, & Van Dongen, 1998).

Statistical analysis

Descriptive analyses of all study variables were conducted to examine score distributions and missing values. In the original sample, 6.2% of the participants had missing data on more than half of the items on the questionnaires measuring the dependent or independent variables (i.e., 54 participants of originally 866 participants in total). These participants were excluded from further analyses. In addition, 3 participants had not filled out their gender. For the remaining 809 participants, Little's (1988) Missing Completely At Random test indicated that their values were missing at random. Therefore, we replaced these missing values by single imputation using the Expectation Maximization algorithm. This is an efficient way of handling missing data when it is missing at random or completely at random (Dong & Peng, 2013).

We examined gender differences using independent sample *t*-tests and estimated effect sizes using Cohen's *d*. Associations between study variables were examined using Pearson correlations. Thereafter, we conducted multiple hierarchical regression analyses in order to examine the associations between effortful control, perceived parenting, and externalizing and internalizing psychopathology. In all analyses, the first step included main effects of gender, age, school, effortful control, and parenting. In step two, we added two-way interactions between effortful control and parenting. Finally, in step three, three-way interactions were included in order to test whether the associations between effortful control, parenting, and psychopathology differed between boys and girls. To reduce problems with multicollinearity, all continuous independent variables were mean centered (Kraemer & Blasey, 2004). Estimates of effect sizes were estimated by calculating the squared semi-partial correlations (sr^2) for significant effects (e.g., Fritz, Morris, & Richler, 2012). When significant interaction effects were found, simple slopes were calculated using the Process macro for SPSS (Hayes, 2013). This allowed us to test whether effortful control affected psychopathology at different levels of parenting. In addition, Johnson-Neyman's (1936) significance regions were calculated to determine the range of values of the moderator for which there was a significant association between effortful control and psychopathology.

2.3 RESULTS

Descriptive analyses

Descriptive statistics and correlations between all study variables are reported in Table 1. Independent sample *t*-tests showed that boys reported more externalizing problems (i.e., Cohen's *d* for interpersonal aggression = 0.44, for rule-breaking behavior *d* = 0.17), whereas

girls reported more internalizing problems (i.e., Cohen's *d* for depressive = 0.30, and for anxiety problems *d* = 0.37). Interpersonal aggression and rule-breaking behavior were not normally distributed. Therefore, we calculated correlations involving these variables by using Spearman's rho instead of Pearson's correlations (e.g., Field, 2009). Generally, effortful control was negatively associated with both externalizing and internalizing psychopathology. In addition, parental psychological control was positively associated with more externalizing and internalizing psychopathology. Autonomy support was negatively associated with internalizing psychopathology, but unrelated to externalizing psychopathology.

Effortful control, parenting, and externalizing and internalizing psychopathology

Table 2 shows results of the hierarchical regression analyses of interpersonal aggression, rule-breaking behavior, depressive problems, and anxiety problems. Because we were mainly interested in the interaction effects between effortful control and perceived parenting, we limited our discussion to the interaction effects, but reported all effects in Table 2. Of note, to test the hypotheses for externalizing problems, dependent variables were log transformed, and we performed bootstrapping because interpersonal aggression and rule-breaking behavior were not normally distributed (Russel & Dean, 2000). Furthermore, the assumption of homoscedasticity was violated in the regression analyses including interpersonal aggression, rule-breaking behavior, and anxiety problems. Therefore, we tested whether heteroscedasticity led to invalid hypothesis testing in these models, by using heteroscedasticity-consistent standard error (HCSE) estimators in Ordinary Least Square regression (version HC3, Hayes & Cai, 2007).

Interpersonal aggression. Two-way interactions between effortful control and perceived parenting, and three-way interactions that additionally included gender, did not significantly predict interpersonal aggression (see Table 2). Main effects indicated that younger age (sr^2 < .01), lower effortful control (sr^2 = .04), and more parental psychological control (sr^2 = .01) were associated with more interpersonal aggression. In addition, boys displayed more interpersonal aggression than girls (sr^2 = .06).

Rule-breaking behavior. With regard to rule-breaking behavior, there was a significant three-way interaction between effortful control, autonomy support, and gender (sr^2 = .01). We calculated simple slopes for effortful control at low (1 *SD* below the mean), and high (1 *SD* above the mean) levels of autonomy support. For both genders, there was a significant negative association between effortful control and rule-breaking behavior at all levels of autonomy support, such that lower levels of effortful control were associated with more rule breaking (see Figure 1a). As hypothesized, for boys the association between effortful control and rule-breaking behavior was stronger at high levels of autonomy support (b_{boys} slope low = -0.12, *SE* = 0.05, CI 95% [-0.23; -0.02]; b_{boys} slope high = -0.20, *SE* = 0.05, CI 95% [-0.29; -0.12]).

Table 1. Descriptive statistics and bivariate correlations of age, effortful control, parenting and internalizing and externalizing problems (N = 809)

		1.	2.	3.	4.	5.	6.	7.	8.
1. Age		-							
2. Effortful control		-.09*	-						
3. Psychological control		.08*	-.27**	-					
4. Autonomy Support		.12**	.25**	-.37**	-				
5. Interpersonal aggression		-.05	-.18**	.15**	-.06	-			
6. Rule-breaking behavior		.10**	-.34**	.28**	-.07	.51**	-		
7. Depressive problems		.09*	-.33**	.33**	-.22**	.13**	.27**	-	
8. Anxiety problems		.04	-.15**	.23**	-.17**	.03	.11*	.59**	-
Boys (n = 439)	*M*	13.90	3.41	2.03	3.90	1.46	1.36	1.76	1.55
	SD	1.05	0.49	0.79	0.73	0.57	0.48	0.49	0.51
Girls (n = 370)	*M*	13.76	3.46	1.95	3.91	1.23	1.28	1.91	1.76
	SD	1.06	0.55	0.75	0.83	0.48	0.44	0.58	0.61
	t	t(807) = 1.92	t(807) = -1.46	t(807) = 1.39	t(744.38) = -0.18	t(807.00) = 6.27**	t(801.42) = 2.22*	t(724.59) = -3.87**	t(732.49) = -5.42**

*. $p < .05$; **. $p < .001$

In contrast, for girls the association between effortful control and rule breaking was stronger for those who perceived low levels of autonomy support (i.e., b_{girls} slope low = -0.20, *SE* = 0.03, CI 95% [-0.27; -0.13]; b_{girls} slope high = -0.10, *SE* = 0.03, CI 95% [-0.16; -0.05]).

Depressive problems. Two-way interactions between effortful control and psychological control (sr^2 = .02) and between effortful control and autonomy support (sr^2 = .01) were significantly associated with internalizing psychopathology. In contrast to the first hypothesis, a simple slope analysis showed that at low levels of parental psychological control (*b* slope low = -0.42, *SE* = 0.06, CI 95% [-0.53; -0.31]), lower effortful control was associated with more depressive problems (Figure 1b). At high levels of psychological control (i.e., scores of .71 above the mean of 0, and higher), there was no association between effortful control and depressive problems. For autonomy support, a significant negative association was found between effortful control and depressive problems, at low and high levels of support (Figure 1c). In contrast to the first two hypotheses, this association was stronger when levels of autonomy support decreased (i.e., *b* slope low = -0.37, *SE* = 0.06, CI 95% [-0.50; -0.25]; *b* slope high = -0.16, *SE* = 0.05, CI 95% [-0.27; -0.05]). Furthermore, regions of significance showed that only at extremely high levels of autonomy support (i.e., scores of 1.05 above the mean and higher), there was no association between effortful control and depressive problems.

Finally, in contrast to hypothesis 3, there were no significant three-way interactions between gender, effortful control, and perceived parenting in predicting depressive problems. However, a significant interaction effect between gender and psychological control (sr^2 = .01) indicated that the positive association between parental psychological control and depressive problems was stronger for girls than for boys (i.e., b_{girls} slope = 0.25, *SE* = 0.05, CI 95% [0.16; 0.34]; b_{boys} slope = 0.14, *SE* = 0.03, CI 95% [0.08; 0.20]).

Anxiety problems. Two-way interactions showed that the negative association between effortful control and anxiety problems depended on the level of parental psychological control (sr^2 = .01). Similar to the results on depressive problems, there was only a significant negative association between effortful control and anxiety at lower and intermediate levels of parental psychological control (i.e., *b* slope low = -0.24, *SE* = 0.07, CI 95% [-0.36; -0.11]). At psychological control scores of .18 above the mean or higher, the association between effortful control and anxiety problems was not significant (Figure 1d). The regression analysis suggested that this interaction differed between boys and girls (sr^2 < .01), but when tested with the HCSE estimator, this association was no longer significant (i.e., *b* = 0.22, *SE(HC)* = 0.12, CI 95% [-0.01; 0.45]). Hence, our gender hypothesis was not supported by the data. There was a positive interaction between psychological control and gender (sr^2 = .01), suggesting that for girls the positive association between parental psychological control and anxiety problems was stronger than for boys (i.e., b_{girls} slope = 0.24, *SE* = 0.05, CI 95% [0.14; 0.33]; b_{boys} slope = 0.07, *SE* = 0.04, CI 95% [0.01; 0.14]).

Table 2. Regression analyses effortful control and parenting on externalizing and internalizing problems

	Externalizing problems				Internalizing problems			
	Interpersonal aggression		Rule-breaking behavior		Depressive problems		Anxiety problems	
	B(SE)	95% CI	*B(SE)*	95% CI	*B(SE)*	95% CI	*B(SE)*	95% CI
R^2	0.12**		0.16**		0.23**		0.13**	
Constant	.49 (0.19)		.08 (0.18)		1.44 (0.30)		1.12 (0.33)	
Age	-0.01 (0.01)*	-0.04; -0.01	0.01 (0.01)	-0.02; 0.03	0.02 (0.02)	-0.02; 0.06	0.02 (0.02)	-0.03; 0.06
Gender	-0.15 (0.02)*	-0.19; -0.11	-0.03 (0.02)	-0.06; 0.00	0.18 (0.03)**	0.12, 0.25	0.24 (0.04)**	0.16; 0.31
School De Hague	0.03 (0.03)	-0.03; 0.09	0.08 (0.02)*	0.04; 0.13	0.18 (0.05)*	0.09; 0.27	0.18 (0.05)**	0.08; 28
School Dordrecht	-0.04 (0.03)	-0.10; 0.02	0.03 (0.03)	-0.02; 0.07	0.10 (0.05)*	0.00; 0.19	0.13 (0.05)*	0.03; 0.23
School Rotterdam	0.04 (0.04)	-0.04; 0.10	0.01 (0.03)	-0.05; 0.07	-0.03 (0.06)	-0.15; 0.09	0.06 (0.07)	-0.08; 0.20
EC	-0.12 (0.02)*	-0.16; -0.08	-0.16 (0.02)*	-0.20; -0.13	-0.25 (0.03)**	-0.32; -0.19	-0.10 (0.04)*	-0.18; -0.03
PsyC	0.03 (0.02)	0.00; 0.07	0.04 (0.02)*	0.01; 0.07	0.16 (0.02)**	0.11; 0.21	0.12 (0.03)**	0.07; 0.18
AuS	0.01 (0.02)	-0.02; 0.05	0.01 (0.02)	-0.02; 0.04	-0.05 (0.02)*	-0.10; -0.01	-0.07 (0.03)*	-0.10; -0.02
ΔR^2	0.00		0.00		0.02**		0.02*	
EC x PsyC	0.00 (0.03)	-0.06; 0.06	0.01 (0.03)	-0.04; 0.06	0.20 (0.02)**	0.10; 0.30	0.13 (0.06)*	0.02; 0.24
EC x AuS	0.00 (0.03)	-0.05; 0.07	0.02 (0.03)	-0.03; 0.07	0.11 (0.05)*	0.05; 0.23	0.06 (0.05)	-0.04; 0.17
EC x Gender	0.06 (0.04)	-0.01; 0.13	0.03 (0.04)	-0.04; 0.10	0.07 (0.07)	-0.10; 0.17	0.09 (0.08)	-0.06; 0.24
PsyC x Gender	0.02 (0.03)	-0.05; 0.08	-0.00 (0.03)	-0.06; 0.06	0.04 (0.05)*	0.02; 0.21	0.16 (0.06)*	0.05; 0.27
AuS x Gender	-0.04 (0.04)	-0.10; 0.03	-0.02 (0.03)	-0.08; 0.04	0.01 (0.05)	-0.08; 0.10	-0.02 (0.05)	-0.12; 0.09
ΔR^2	0.01*		0.01*		0.00		0.01*	
EC x PsyC x Gender	-0.09 (0.07)	-0.22; 0.05	-0.02 (0.05)	-0.13; 0.09	0.16 (0.10)	-0.04; 0.35	0.22 (0.11)*	0.00; 0.44
EC x AuS x Gemder	0.08 (0.06)	-0.05; 0.20	0.11 (0.06)*	0.01; 0.22	0.04 (0.10)	-0.15; 0.22	-0.07 (0.11)	-0.28; 0.15

EC = effortful control, PsyC = parental psychological control, AuS = parental autonomy support

Note. Gender is a dummy variable with being male serving as the reference group

Note. School is a dummy variable with location 'Tilburg' serving as the reference group

*. $p < .05$; **. $p < .001$

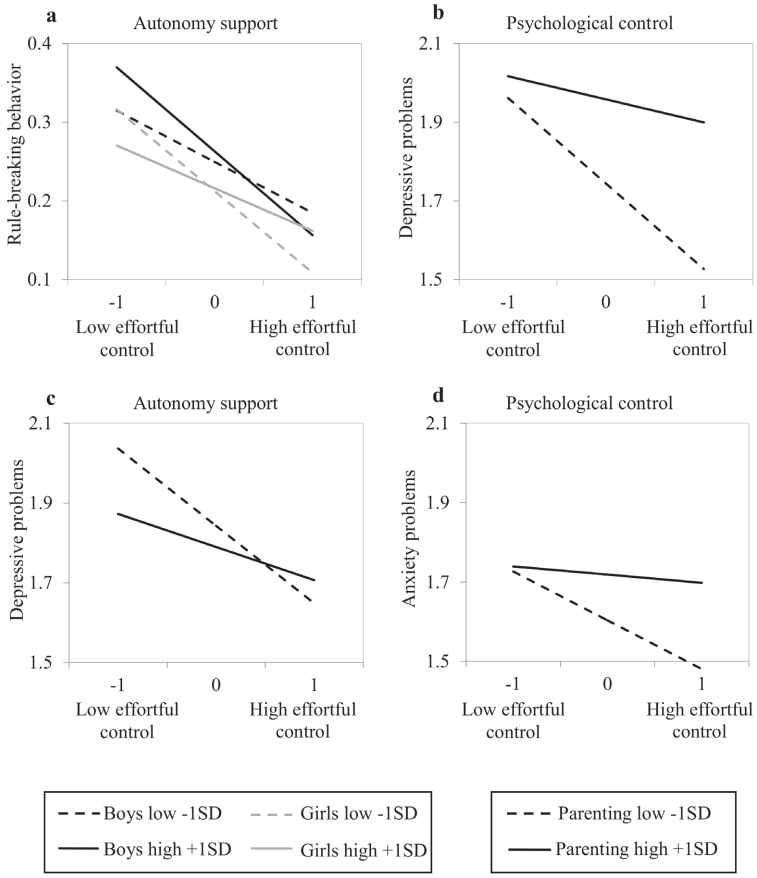


Figure 1. Two- and three-way interactions effortful control and parenting on externalizing and internalizing problems

2.4 DISCUSSION

In this study, we examined interactions between effortful control and perceived parenting in relation to externalizing and internalizing problems in adolescents. Because normative developmental tasks in adolescence place high demands on self-control, we hypothesized that youth with low effortful control may require more parental involvement (i.e., lower autonomy granting) to cope with these developmental tasks and subsequently avoid psychopathology. Our results supported this hypothesis in boys: *higher* levels of autonomy support exacerbated the negative association between effortful control and rule breaking. In contrast, in girls this was the case for *lower* levels of autonomy support. In both genders, lower levels of autonomy support were associated with depressive problems in adolescents with low effortful control. Our second hypothesis was not supported, as lower levels

of psychological control and autonomy support did not mitigate negative associations between effortful control and adolescents' psychopathology. Moreover, although parenting was related to psychopathology in adolescents with low levels of effortful control, the predominant pattern of findings was that these adolescents reported more psychopathology, regardless of perceived parenting, gender, and type of psychopathology.

The finding that lower levels of parental involvement exacerbated rule-breaking behavior in boys with poor effortful control suggests that these boys have difficulties in regulating their behavior, and thus require external sources of control. In line with this, Bates et al. (1998) showed that higher levels of maternal control could be a protective factor against externalizing problems in children with poor self-regulatory capacities. Furthermore, our results align with previous research showing that behavioral autonomy is associated with rule breaking in adolescence (Beyers & Goossens, 1999).

For girls with low levels of effortful control, this association was different: lower levels of autonomy support were more strongly related to rule-breaking. A possible explanation for this gender difference is that because boys are at higher risk for rule-breaking behavior than girls (e.g., Crick & Zahn-Waxler, 2003), they need more stringent rules (Lengua, 2008). Furthermore, in early and mid-adolescence, biological maturation differs between boys and girls (Beyers & Goossens, 1999), as girls are approximately two years ahead in their biological development (Tanner, Whitehouse, & Takaishi, 1966). Importantly, this biological development likely precedes the development of autonomy striving in adolescence (Steinberg, 1987) and is associated with psychological processes such as personality development (Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2009). Because we studied young adolescents, it is possible that higher levels of parental autonomy support fit better with low-effortful-control girls' developmental stage than that of boys, such that lower levels of autonomy were associated with more rule breaking. This also implies that our results regarding the associations between effortful control and rule-breaking behavior in boys who perceived high autonomy support in part reflect the boys' immaturity in establishing autonomy and individuation (see also Dishion et al., 2004). Hence, both premature behavioral autonomy and poor effortful control can be risk factors for rule-breaking behavior in young adolescents.

Furthermore, different parenting-related risk factors were associated with externalizing and internalizing psychopathology in adolescents with low effortful control. For both genders, lower levels of autonomy support were more strongly related to depressive problems in youth with low levels of effortful control. Corroborating this with the findings on rule-breaking behavior, this suggests that for boys with low levels of effortful control, both high and low levels of autonomy support are associated with psychopathology. Although perceiving low levels of autonomy support can mitigate rule-breaking behavior in boys with low effortful control, it may also lead to feelings of being restricted, which in turn may be associated with depressive problems. Therefore, it seems that parents of boys with low levels of effortful control should strive for a balance between low and high

levels of autonomy support in order to protect their boys against psychopathology (see also Sentse, Dijkstra, Lindenberg, Ormel, & Veenstra, 2010). In contrast, for girls, findings are similar for depressive problems and rule-breaking behavior and resonate with earlier research, which indicated that higher levels of psychological autonomy are associated with better adolescent functioning in general and with lower levels of internalizing problems in particular (Gray & Steinberg, 1999).

We found no support for our second hypothesis, but instead found that particularly lower levels of psychological control strengthened negative associations between effortful control and internalizing problems. These findings are in contrast with earlier research on parental psychological control. Yet, Beyers and Goossens (1999) already reported that emotional autonomy, provided through low levels of psychological control, is associated with internalizing problems in adolescence. We extended these findings by showing that emotional autonomy is more strongly related to psychopathology in adolescents with low effortful control. Furthermore, reported psychopathology among adolescents with low effortful control did not appear to depend on the levels of parental psychological control they perceived. Both low and high levels of psychological control thus seem risk factors for psychopathology in adolescents with low levels of effortful control. In line with findings on autonomy support for boys, this suggests that parents of adolescents with low effortful control should also strive for optimally balanced, rather than low or high, levels of control to lower risk for psychopathology (Lengua, 2008; Sentse et al., 2010).

Finally, we found no support for our gender hypothesis. However, we found that for girls in general, perceived psychological control was more strongly related to internalizing problems. To date, results on gender differences in the association between psychological control and adolescent psychopathology have been inconsistent, and findings often indicate that influences of psychological control are universal across gender (e.g., Cui, Morris, Criss, Houltberg, & Silk, 2014). However, our finding resonates with the more general vulnerability hypothesis, which states that compared to boys, girls' internalizing problems are more influenced by parenting because they are at higher risk to develop internalizing problems.

Some limitations need to be mentioned. First, most of the reported associations of effortful control and parenting with externalizing and internalizing psychopathology had small effect sizes, and thus should be interpreted with caution. Second, our data were solely based on self-reports. It is likely that reports on perceived parenting were colored by other factors, such as the quality of the parent-child relationship. Nevertheless, adolescents' perceptions of parenting are highly important in studying associations with their behavior, because adolescents' mental representations of their parents' behavior will likely matter more than the parents' actual behavior (Main, Kaplan, & Cassidy, 1985). Third, our sample mainly included adolescents who were enrolled in the higher educational tracks of secondary school. Academic success is associated with higher levels of effortful control (Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). Therefore, adolescents with poor

effortful control may have been underrepresented in this study. Fourth, because our results were based on cross-sectional data, parenting styles may have been reflections of parents' reactions to symptoms of adolescent psychopathology. Previous research suggests that parental involvement can be reduced as a reaction to being confronted with adolescent problem behavior (Dishion et al., 2004). This may explain our findings regarding rule-breaking behavior and high autonomy support in boys with low effortful control. Finally, we did not examine interactions between parenting styles, which may have affected our results on psychological control. It has been suggested that the consequences of emotional autonomy may differ depending on the quality of the child-parent relationship (Lamborn & Steinberg, 1993), such that emotional autonomy is associated with good psychosocial adjustment when adolescents also perceive high parental support. Future research could examine this hypothesis, because to our knowledge, these parenting style interactions have not been examined in adolescents with low effortful control yet.

In sum, we showed that low effortful control is associated with psychopathology. Parenting affected this association in several ways, depending on the type of psychopathology and the adolescent's gender. Based on the current study it is not clear whether more psychological autonomy granting of parents can buffer against psychopathology in youth with low levels of effortful control. Yet, for adolescents with poor effortful control, perceived autonomy support can affect the level of externalizing and internalizing psychopathology to some extent, with different effects for boys and girls. For girls with poor effortful control, particularly lower levels of autonomy were associated with psychopathology, whereas for boys with low effortful control, higher levels of perceived autonomy increased the display of rule-breaking behavior. Caution is warranted as these results were based on cross-sectional data and represented small effect sizes. Our conclusions are thus tentative and require replication, preferably in a longitudinal design that can test the directionality of effects. Nevertheless, these results suggest that especially for boys with poor effortful control, future research should aim to find what optimal levels of parental support and control are, for whom, and under what circumstances, in order to find out to what extent parents can loosen the reins, while still keeping a safe grip.

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Chapter 3

Social support, attachment and externalizing behavior in forensic patients with Attention-Deficit Hyperactivity Disorder

ABSTRACT

This study was designed to provide more insight into the relationship between social support and externalizing behavior in forensic patients with ADHD. Because ADHD is highly associated with psychosocial impairment, we expected poor social support and attachment insecurity (i.e., preoccupied, fearful, and dismissive attachment) to be associated with higher levels of externalizing behaviors in forensic patients with ADHD. Self-reports of 32 forensic male outpatients with ADHD (*M* age = 35.34) were compared with self-reports of healthy (*n* = 32; *M* age = 33.84), and 'at risk' control males with (a history of) psychological problems (*n* = 30; *M* age = 36.47) from the general population. In addition, associations between social support, attachment and externalizing behaviors (i.e., aggression, antisociality, anger and hostility) were examined within the sample as a whole. Analyses of variance showed that forensic patients with ADHD had higher levels of externalizing behaviors and insecure attachment, and lower levels of secure attachment compared to both healthy and at risk controls. Multivariate regression analyses showed that social support was not associated with any of the externalizing behaviors, after accounting for attachment. In contrast, insecure attachment was associated with higher levels of all externalizing behaviors examined. Finally, insecure attachment best explained antisociality and hostility, suggesting that attachment is more important than other psychopathological risk factors that distinguish the different groups.

3.1 INTRODUCTION

Supportive social relationships have consistently been described as a protective factor against externalizing behavior in sociological, criminological, and psychological theories of offending (e.g., Bowlby, 1973; Cullen, 1994; Hirschi, 1969). Externalizing behavior is an umbrella term including numerous behavioral problems that are often directed negatively at the external environment (e.g., Liu, 2004). Externalizing behavior thus includes oppositional, hostile, or intrusive behavior, but also more severe antisocial behaviors, such as aggression and offending behavior. Support from others can provide affective and instrumental resources, which help individuals cope with adverse life experiences (e.g., Simons et al., 2006), and stimulate social and psychological well-being throughout the life-span. As such, social support can lower the risk of engaging in externalizing behavior (e.g., Baldry & Farrington, 2000; Cullen, 1994; Cullen & Wright, 1997; Meeus, Branje, & Overbeek, 2004). Previous research on adult offenders has shown that higher levels of emotional support are associated with fewer general and violent rule violations in prison (Jiang, Fisher-Giorlando, & Mo, 2005), and lower levels of hostility after prison release (Hochstetler, Delisi, & Pratt, 2008). Hence, enhancing social support is often an important treatment goal in forensic treatment programs (Ward & Brown, 2004).

Yet, empirical support for the protective role of social support on externalizing behavior in forensic psychiatric patients is mixed (e.g., Bouman, De Ruiter, & Schene, 2010; Jacoby & Kozie-Peak, 1997; Skeem, Eno Louden, Manchak, Vidal, & Haddad, 2009). Forensic psychiatric patients may differ from other offending populations to the extent that they are, by definition, troubled with mental health problems, which are associated with their offending. Regarding the role of social support in forensic psychiatric patients, some studies have indicated that social support is more associated with general well-being than with specific externalizing behaviors (Skeem et al., 2009). It has also been speculated that when many risk factors for externalizing behavior are present in high risk samples, social support is not powerful enough to buffer against these risks (Cusick, Havlicek, & Courtney, 2012). Therefore, forensic psychiatric patients may differ from other offender samples in the extent to which they benefit from social support.

Moreover, within forensic psychiatric patients there is much heterogeneity in terms of psychiatric problems and the extent to which these problems may affect social support. As such, more research is needed on the specific associations between social support and externalizing behavior in different forensic psychiatric samples. In the current study, we focus on forensic patients with Attention-Deficit Hyperactivity Disorder (ADHD; American Psychiatric Association, 2013). Patients with ADHD have an increased vulnerability to social network influences because of poor self-regulation and higher levels of insecure attachment (Storebø, Rasmussen, & Simonsen, 2016). In addition, the core symptoms of ADHD (in particular, impulsivity) and its high comorbidity with other externalizing disorders (e.g., Young, 2007; Young & Thome, 2011) are likely to place forensic psychiatric

patients with ADHD at increased risk for offending and impaired social support. In order to understand the role of social support in relationship to externalizing behavior in this high risk sample, we thus argue that risk factors related to ADHD should also be taken into account.

Furthermore, to understand unique associations between social support and externalizing behavior in forensic psychiatric patients with ADHD, we argue that it is pivotal to also consider risk factors for externalizing behavior that are likely to be associated with social support experiences, such as social support seeking, social support availability, and the extent to which patients can benefit from social support. To this end, we examine patients' levels of attachment (in)security.

Attachment and externalizing behavior

In attachment theory (Bowlby, 1973), it is described that in early interactions with attachment figures, individuals learn how to regulate their feelings, and form prototypical working models of significant others, and the self, which guide future expectations about social relationships. Key features of these attachment representations are (1) whether or not others are experienced as responsive to cries for support and protection, and (2) whether or not the self is concerned as being worthy of this care from others. Serious disruptions in the relationships between caregivers and children can result in a child's distrust and disbelief in the availability and security of (future) others, and insecure attachment behaviors (for example, avoiding closeness in order to protect oneself from getting hurt or becoming disappointed). These negative representations are further expected to impact upon an individuals' emotional and social functioning (Bowlby, 1973). Although the empirical links between early attachment, attachment representations, and psychological functioning are yet to be validated, there is strong support from meta-analyses for a positive association between early insecure attachment behaviors and externalizing behavior in children from healthy and clinical populations (e.g., Fearon, Bakermans-Kranenburg, Van IJzendoorn, Lapsley, & Roisman, 2010). In adults, the empirical support for these links is mainly indirect, and still limited. For example, some work has indicated positive associations between early disruptive experiences with caregivers, insecure attachment in close adult relationships, and increased levels of adult externalizing behavior (Muller, Thornback, & Bedi, 2012).

Furthermore, forensic psychiatric patients are often characterized by histories of early disruptive social experiences (e.g., Van IJzendoorn et al., 1997), which have been reflected in high levels of insecure attachment representations in adulthood (e.g., Levinson & Fonagy, 2004; Frodi, Dernevik, Sepa, Philipson, & Bragesjö, 2010). Levels of attachment insecurity are hypothesized to be strongly associated with externalizing behavior in forensic psychiatric patients. Previous research on general population samples suggests that these associations can be indirect, for example via the influence on (future) experiences of social support (Collins & Feeney, 2004; Vogel & Wei, 2005), or the impact of attachment

insecurity on patients' mental health problems in general (Van IJzendoorn et al., 1997). Yet, attachment insecurity could also be directly associated with externalizing behavior in forensic psychiatric patients. This notion is supported by a recent meta-analysis on attachment and violence (Ogilvie, Newman, Todd, & Peck, 2014), in which the authors showed that forensic psychiatric patients differ from other clinical- and offender samples in the type of attachment *styles* they possess. As such, it was suggested that specific insecure attachment styles are related to both the presence and severity of psychiatric problems in offender populations, and the initiation of more severe violence within forensic psychiatric patients.

Specifically, in adults four attachment styles have been identified (Bartholomew & Horowitz, 1991), from which hypotheses can be formulated on the links between attachment styles and specific problem behaviors. These attachment styles are reflective of a person's current feelings within interpersonal relationships, and are based on a dichotomized view of the internal working models of one's self and other people, as described by Bowlby (1973). *Securely* attached individuals have positive images of both the self and others. Secure attachment is argued to be associated with general mental health, and protects against problem behavior (Mikulincer & Florian, 2003). *Preoccupied* individuals also hold positive views of others, but hold negative views of the self. Individuals with a preoccupied attachment style are constantly striving for self-acceptance by gaining others' approval (Bartholomew & Horowitz, 1991). These individuals are highly focused on their own feelings of distress and their need of others, and therefore are more likely to develop problem behaviors characterized by an internal focus: i.e., internalizing problem behavior (Dozier, Stovall-McClough, & Albus, 2008). Moreover, because externalizing behavior is often disapproved by the environment, engagement in this behavior puts individuals at risk for losing relationships with important others (Hirschi, 1969). Therefore, it can also be argued that for secure and preoccupied attached individuals, externalizing behavior has more negative consequences, making them more likely to regulate negative emotions in different ways.

In contrast, *fearful-avoidant* attached individuals who have negative images of both the self and others, and *dismissive-avoidant* attached individuals who have negative views of others, but positive views of the self, may be more vulnerable to develop externalizing behavior. Both are hypothesized to avoid close relationships with other people, as they fear (fearful) or expect (dismissive) others to disappoint them (Bartholomew & Horowitz, 1991). Dismissive individuals are further assumed to project their negative feelings outward, by defensively turning their attention away from their protected positive self-image, and their lacking need of others (Dozier et al., 2008). As such, dismissive attachment is hypothesized to be most strongly associated with externalizing behavior.

Ogilvie et al. (2014) found some support for this hypothesis, by showing that forensic psychiatric patients were more often classified as being dismissively attached, whereas non-offending psychiatric controls were slightly more often classified as being preoccupied

attached. Yet, it is important to note that forensic psychiatric samples are highly heterogeneous in terms of problem behavior, often including individuals with comorbid internalizing and externalizing behaviors. Hence, next to dismissive attachment, high levels of preoccupied, and fearful attachment are also reported in forensic psychiatric samples (e.g., Ogilvie et al., 2014; Timmerman & Emmelkamp, 2006).

Social support, attachment and externalizing behavior

Attachment styles thus shape individual's self-image, their representations, and expectations of others. In this way, they are likely to have an impact on individual differences in the tendency to rely on others for support (Bowlby, 1973). Specifically, because securely and preoccupied individuals are expected to have positive images of others, they are more likely to rely on others for support than individuals with fearful or dismissive attachment styles. Attachment styles have also been associated with the way in which social support is interpreted, such that individuals with insecure attachment styles are inclined to perceive social support as more negative (Florian, Mikulincer, & Bucholtz, 1995), in particular when the content of the provided social support is unclear (i.e., can also be experienced as critique or negative feedback; Collins & Feeney, 2004). Finally, it can be argued that experiences of social support further impact an individuals' attachment representations and attachment style, via the development of adjusted views of others and the self. Given these links between social support and attachment styles, it is striking that current knowledge on the combined associations with externalizing behavior is scarce.

To our knowledge only one study examined group differences in self-reported social support and adult attachment between a (non-violent) offending population and healthy controls (Hawkins-Rodgers, Cooper, & Page, 2005). Compared to healthy controls, non-violent offenders reported fewer people from whom they perceived support and less friendships. However, in contrast to what the authors expected, non-violent offenders reported higher satisfaction with this perceived social support, and could more often be classified as being securely attached compared to healthy controls. The authors hypothesized that gender differences between the samples may have contributed to the unexpected findings. Furthermore, the authors noted that these results may not extend to offenders who engage in more serious offense behavior, such as can be expected of forensic patients with ADHD. Non-violent offenders typically committed crimes such as transporting stolen goods, selling drugs, breaking and entering, robbery, and theft (Hawkins-Rodgers et al., 2005), whereas forensic patients with ADHD are more likely to engage in serious, and often violent offending (e.g., Young & Goodwin, 2010; Young, Wells, & Gudjonsson, 2011). Unfortunately, because concurrent variation in externalizing behaviors were not assessed systematically in the study by Hawkins-Rodgers and colleagues (2005), no conclusion can be drawn about the associations between social support, attachment and externalizing behavior. It thus remains unclear to what extent experienced social support and adult attachment are associated with offenders' concurrent externalizing behavior and previous

offending. Similarly, little is known about such psychosocial risk and protective factors for externalizing behavior in ADHD patients.

Externalizing behavior in ADHD, and the role of social support and attachment

Externalizing behavior in ADHD is often explained by direct associations with ADHD core symptoms, such as impulsivity, and via the high comorbidity between ADHD and other externalizing disorders (e.g., Young, 2007; Young & Thome, 2011).Yet, severe psychosocial impairment is also characteristic for many patients with ADHD (Davidson, 2008). For example, patients with ADHD often lack of social skills and judgement (Weiss & Weiss, 2004). In adults, such impairments are reflected in more marital-, family-, and friendship problems (Eakin et al., 2004, Young, Toone, & Tyson, 2003), and higher levels of self-reported loneliness (Philipsen et al., 2009) compared to healthy controls. Adults with ADHD may therefore perceive lower levels of social support to help them in coping with stressful (life) experiences, including their psychiatric symptoms. In turn, these stressful experiences may further increase the risk to become engaged in externalizing behavior, and to develop internalizing problems as well (Sobanski, 2006).

Higher levels of (different measurements of) insecure attachment have also been reported in patients with ADHD (see for a review; Storebø et al., 2016). In many of these studies, a different approach to the assessment of attachment insecurity has been used than the method of Bartholomew and Horowitz (1991), which is used in the current study. Specifically, these studies support a link between ADHD and disorganized attachment (e.g., Thorell, Rydell, & Bohlin, 2012). Disorganized attachment (and its relationship with externalizing behavior) has mainly been investigated in children, and shows theoretical resemblance to the fearful-avoidant adult attachment style of Bartholomew and Horowitz (1991) (e.g., Simpson & Rholes, 2002). Both forms of insecure attachment can result in fearful attachment behavior, in which an alternation of both avoidant, and anxious approach strategies in interpersonal behavior can be used. Yet, disorganized attached individuals seem to be more disturbed and incoherent in the alternation of these behaviors. Also, disorganized attachment seems to be a stronger mediator between the experience of early trauma, and engagement in externalizing behavior in adult relationships compared to fearful-avoidant attachment (Rholes, Paetzold, & Kohn, 2016). Therefore, some caution is warranted by using these findings to build hypotheses for the attachment styles investigated in the current study.

In children with ADHD, other measures of insecure attachment, such as poor attachment (to mothers) have also been linked to the development of externalizing behavior (Moneta, Rothhammer, & Carrasco, 2016). Moreover, in a recent study on adolescent offenders, attachment disorder symptoms were found to be related to symptoms of hyperactivity, and to more peer problems as well (Moran, McDonald, Jackson, Turnbull, & Minnis, 2017). In research on adults, there is some support for associations between insecure attachment styles and ADHD in non-offender populations. In two studies it

was found that preoccupied and fearful-avoidant attachment styles were most often present in adults with ADHD (Edel, Juckel, & Brüne, 2010; Koemans, Van Vroenhoven, Karreman, & Bekker, 2015). Given that ADHD is in essence often considered as an externalizing disorder, these results may be unexpected. Yet, because high incidences of both internalizing and externalizing problems are reported in adults with ADHD (Jacob et al., 2014), it can be argued that high levels of preoccupied attachment in these samples are indicative of comorbid internalizing problems.

In one of these studies associations between insecure attachment styles and comorbid psychopathology were further examined, and it was shown that patients with ADHD and preoccupied insecure attachment were at higher risk for co-morbid psychopathological problems than patients with ADHD with a secure or dismissive attachment style (Koemans et al., 2015). In that particular study, psychopathology mainly comprised self-reported internalizing problem behaviors. Therefore, different results may be expected in a sample of forensic patients with ADHD.

Current study

In sum, previous research is inconclusive about the role of social support in externalizing behavior in forensic psychiatric patients. To fill this knowledge gap, we argue that it is important to examine attachment styles, because these styles are strongly associated with externalizing behavior in forensic psychiatric patients (Ogilvie et al., 2014). Moreover, attachment styles are likely to affect patients' experiences of social support. Forensic patients with ADHD are expected to engage in severe externalizing behavior (Willcutt et al., 2012; Young et al., 2011). Although the elevated risk for externalizing behavior in patients with ADHD might be explained by psychosocial risk factors, such as social problems, and insecure attachment problems, currently there is little empirical support for this notion. In this study, we therefore compared forensic patients with ADHD with a matched control group from the general population, and examined associations between social support, attachment styles and externalizing behavior within the whole sample as well.

We hypothesized that forensic psychiatric patients with ADHD report lower levels of social support compared to healthy controls, and higher levels of externalizing behaviors (i.e., aggression, antisociality, anger and hostility). In addition, because we expected insecure attachment styles to be positively associated with externalizing behavior, we hypothesized that forensic psychiatric patients with ADHD report more insecure attachment (i.e., preoccupied, fearful, and dismissive attachment) and less secure attachment compared to controls. Moreover, in examining unique associations between social support, attachment styles, and externalizing behaviors in the whole sample, we expected both social support and attachment styles (and in particular dismissive attachment) to be uniquely related to externalizing behavior. Finally, we hypothesized that these associations are stronger in forensic psychiatric patients with ADHD than in

controls, because multiple risk factors related to ADHD and externalizing behavior are likely to interact in this group of patients.

3.2 METHOD

Participants

Forensic patients with ADHD. Forensic patients with ADHD were recruited from a forensic outpatient center in the Netherlands. Inclusion criteria were male gender, being 18 years or older, having an ADHD diagnosis, and no diagnosis of intellectual disability. Except for intellectual disability[1], other (comorbid) diagnoses were no exclusion criteria in this study. In the outpatient center, patients with ADHD receive treatment for their psychiatric disorder(s) and related aggressive or delinquent behavior in different phases. After a diagnostic phase, patients receive psychoeducation for ADHD and its relationship with externalizing behavior, followed by cognitive-behavioral therapy for aggressive or other delinquent behavior, and schema-focused therapy targeted at personality problems, if indicated. Patients can skip treatment phases if indicated. Also, patients are offered 'side modules' including pharmacotherapy, practical support for social-, financial-, work related-, or daily routine-problems, and treatment for substance-related disorders if applicable. Patients are either treated compulsory as part of a juridical measure, or they are in treatment voluntarily after referral by a general practitioner or other mental health care professional. All patients are at risk for coming into contact with the legal justice system (again), because of engagement in serious externalizing behavior. As such, the main goal of treatment in the forensic outpatient center is to reduce risk for (re-)offending.

Thirty-two Dutch forensic outpatients with ADHD (*M* age = 35.34, *SD* = 8.93, range = 19 - 53) participated in this study. All patients, except for one, were diagnosed with one or more comorbid psychiatric disorder(s), and/or personality problems. Comorbid psychiatric disorders most often included externalizing disorders: in particular, addiction (18), and other impulse control disorders (10). Comorbid internalizing disorders included post-traumatic stress disorder (1), anxiety disorders (3), and mood-related disorders (5). Also, three patients had a pervasive developmental disorder not otherwise specified. Regarding personality problems, 15 patients were diagnosed with cluster B personality disorder or traits. Finally, one patient was diagnosed with paranoid personality disorder, one with an unspecified personality disorder, and one with cluster C personality traits.

1 *Note*. After data collection was finished, we learned that one patient with ADHD was later also diagnosed with mild intellectual disability. Because this patient did not seem to have more difficulty with understanding the study materials than the other participants, we decided not to exclude him from the current study.

Only 4 patients received mandatory treatment. Other patients were in treatment voluntarily due to their aggressive behavior. Of the patients who received treatment voluntarily, 17 had been into contact with the legal justice system in the past. Of note, 11 patients were included during a pilot study, and therefore most of them were already receiving treatment at the outpatient center for a longer period of time (i.e., *M* treatment duration in days = 507.09, *SD* = 674.16; range = 49 – 2339). The other patients were included in this study during, or shortly after they finished the diagnostic phase and started treatment in the forensic outpatient center (i.e., *M* treatment duration in days = 147.62, *SD* = 110.46; range = 49 – 566; *see procedure for the exact procedure*). Group comparisons of these two patient groups using independent sample *t*-tests showed patients did not differ on any of the study variables of interest. Nevertheless, there was much variability in patients' treatment phase. Five patients were included during or right after the diagnostic phase, and 16 were receiving psychoeducation for ADHD and externalizing behavior. Four patients were already receiving cognitive-behavioral therapy for aggressive or other delinquent behavior, 2 were receiving schema-therapy for personality problems, and 4 others were receiving long-term psychological-, or pharmacological "maintenance" therapy in order to keep their treatment progress stabilized. Of note, at time of data assessment 17 patients received psychotropic medication for ADHD (i.e., 11 patients), and/or comorbid disorders.

Control group(s). By means of convenience sampling, a control group of 110 Dutch males was recruited from the general population by Psychology under-graduates and graduates. Of this sample, a subsample of 32 healthy matched controls (*M* age = 33.84, *SD* = 9.98, range = 18 - 55) was selected based on age, educational level, and when possible, marital status. Because we wanted to control for the presence of psychiatric problems (and specifically, ADHD) within the control group, participants were asked whether they were currently receiving treatment or had received treatment for mental health problems in the past. Of the 110 participants, 32 participants reported that they were currently in treatment, or had been in treatment in the past. From these 32 participants, we excluded two persons. One person was excluded because he was diagnosed with ADHD, the other one because he had received treatment for delinquent behavior in the past. The remaining 30 participants (*M* age = 36.47, *SD* = 11.06, range = 20 - 56) reported current (i.e., in the case of 10 participants) and past (i.e., 20 participants) mental health problems that ranged from milder insecurity issues and anxiousness, to more serious anxiety problems, trauma, and depression. One participant reported having a borderline personality disorder. Finally, another participant reported being suicidal in the past. We used the data of these 30 participants to form an additional control group, reflecting an 'at risk' sample for the development of (more severe) psychiatric problems within the general population.

Procedure

The current study was part of a larger study aimed at examining patient and contextual factors associated with externalizing behavior and treatment motivation in forensic patients with ADHD. This study was conducted in accordance with the American Psychological Association's ethical guidelines and approved by the local Institutional Ethical Review Board at our university. When patients met the inclusion criteria, and there were no major objections for participation (such as having a psychotic episode, or being in crisis), therapist were asked to invite patients to participate after they (had almost) finished the diagnostic phase in order to indicate their treatment plans. Patients who were interested in participating received an information letter about the study's aim and procedure, and were contacted to plan a research appointment at the outpatient center. Patients were informed that participating in the study was voluntarily and that they could withdraw from the study at any given moment, without any reason. Participation included one research appointment of approximately 2 hours, including a 15 minute break.

Prior to data collection, patients signed written informed consent. Data collection included participating in three computer tasks and filling out a number of self-report questionnaires together with one of the researchers. Patients received a gift voucher for their participation of either 5, 10 or 15 euro's based on their performance on one of the computer tasks, and an additional gift voucher to reimburse their travelling expenses. Data collection took place from October 2016 to March 2018. In addition, due to difficulties with including patients in the study, the current study also made use of data collected during a pilot study. The pilot study was conducted in the period from January 2016 until April 2016. The procedure of the pilot study mostly differed from that of the original study in terms of patient inclusion, such that in the pilot study, we also included patients who already were receiving treatment at the forensic outpatient center for a longer period of time. Also, during the pilot study patients were asked to fill-out the standardized questionnaires by themselves.

Control group. Participants in the control group were informed that they participated in a study on impulsivity and social relationships. Data collection took place at participants' homes. In contrast to the patient group, participants of the control group filled out the self-report questionnaires by themselves, but students were present to answer questions when needed. Participants from the control group did not receive a standard gift voucher for their participation, but competed with each other over one gift voucher of 15 euro's based on their scores on one of the computer tasks. The person with the highest score won the gift voucher.

Measures

Social support. In order to assess social support, participants were first asked to list (a maximum of 10) network members who played an important role in their lives at that moment. Of these network members, several demographic characteristics and criminogenic

risk factors were assessed (i.e., presence of own mental health problems, offense history). Thereafter, participants were asked to indicate to whom of these network members they would like to turn to for support, in case they would have a problem; to whom of these network members they would actually turn to for support in case they had a problem; on whom of these network members, they wished that they could always count on, no matter what; and, on whom of these network members they could actually always count on, no matter what. Participants' social support scores were computed by summing the number of listed network members for each of these four questions, and dividing this number through the total number of network members that were listed as playing an important role in participants' lives at the moment. As such, higher scores on the social support scale, indicated higher levels of (proportional) perceived social support as provided by the most important network members of each participant. The reliability of the total scale including the four questions ($\alpha = .84$) proved to be sufficient in this study.

Attachment. Attachment styles were measured with the Attachment Styles Questionnaire (ASQ; Van Oudenhoven, Hofstra, & Bakker, 2003), which aims to assess adult attachment from a general perspective. That is, the questionnaire is not developed to measure specific attachment styles within particular relationships (such as attachment to parents), but includes general statements about relationships with other people, such as: "I find it relatively easy to get close to others", "I do not really feel safe in forming close relationships, because I fear I will get hurt", and "I am afraid that I will get disappointed when I become too close to others". Participants indicated on a five-point scale (*1 = strongly disagree* to *5 = strongly agree*) to what extent they agreed with the statements. By averaging the items, four attachment style scales were computed: including, secure (8 items; $\alpha = .75$), preoccupied (7 items; $\alpha = .84$), fearful (5 items; $\alpha = .83$), and dismissive attachment (4 items; $\alpha = .61$). Higher scores on each attachment scale indicated higher levels of the particular attachment style. The ASQ takes a dimensional approach to attachment, assuming that individuals can have higher scores on more than one attachment style. The questionnaire is thus not suited for classifying individuals into one particular style of attachment. The ASQ has been shown to have sufficient reliability and construct validity in research on the general population (Van Oudenhoven et al., 2003).

Externalizing behaviors. Externalizing behaviors were assessed with two questionnaires. These included four items of the Impulsive Antisociality scale creation of the International Personality Item Pool – NEO inventory (Witt, Donnellan, & Blonigen, 2009) to measure antisociality ($\alpha = .69$). The Impulsive Antisociality scale includes items such as "I take advantage of other people", and "I obstruct other people's plans", which are rated on a four-point scale (*1 = completely disagree* to *4 = completely agree*). In addition, a short form of the Aggression Scale (Bryant & Smith, 2001; Buss & Perry, 1992) was administered to assess self-reported (verbal and physical) aggression (6 items; $\alpha = .83$), anger (3 items; $\alpha = .86$), and hostility (3 items; $\alpha = .83$). The Aggression Scale includes items such as "Sometimes, I cannot suppress the tendency to hit someone", and "I have

difficulty keeping my composure", which are rated on a five-point scale (*1 = completely disagree* to *5 = completely agree)*. Higher mean total scores on the scales were indicative of more self-reported externalizing behavior. The psychometric properties of both scales have been shown sufficient in previous research on clinical samples (e.g., Hornsveld, Muris, Kraaimaat, & Meesters, 2009; Witt et al., 2009).

Statistical analyses

First, descriptive analyses were conducted to examine score distributions and missing values. Three participants of the at risk control group had missing data on social support and were therefore excluded from the analyses including this variable. Second, group differences on background characteristics were explored using independent sample *t*-tests, and Fisher's exact tests. Moreover, correlations between the study variables were examined. Because almost none of the dependent and independent variables were normally distributed (i.e., except for secure, preoccupied, and fearful attachment), correlations were calculated with these variables by using Spearman's rho instead of Pearson's correlations (Field, 2009). Third, group differences on social support and attachment styles, and group differences on externalizing behaviors were tested respectively, using two multivariate analysis of variance (MANOVA). We corrected for multiple hypotheses testing using the Holm-Bonferroni method (Gaetano, 2013; Holm, 1979). When significant group differences were found in the multivariate analyses, these were further explored using univariate analyses of variance (ANOVA). Also, because almost none of the dependent and independent variables were normally distributed, we performed bootstrapping (Russel & Dean, 2000) on the ANOVA's and the regression analyses.

Fourth, eight multiple hierarchical regression analyses were conducted in order to examine the unique associations between social support, attachment, and externalizing behaviors (i.e., aggression, antisociality, anger and hostility) within the whole sample. In all analyses, the first step included main effects of group (consisting of two dummy variables; forensic patients with ADHD and at risk controls, healthy controls served as the reference group) and social support. In the second step, attachment styles were included, and in the third step, two-way interactions between social support and group, and attachment styles and group were included to test whether the associations between social support, attachment, and externalizing behaviors differed between groups. All continuous independent variables were mean centered in order to reduce problems with multicollinearity (Kraemer & Blasey, 2004). Because of the limited sample size and the subsequent power issues, we tested the interactions between social support and group, and attachment styles and group on externalizing behaviors in separate hierarchical regression analyses. Finally, when significant interaction effects were found, we calculated simple slopes for the different groups using the Process macro for SPSS (Hayes, 2013).

3.3 RESULTS

Descriptive analyses

Results of the descriptive analyses and correlations are reported in Table 1. Groups did not differ in age, educational level, or number of network members listed in the social support questionnaire. Results of the Fisher's exact test showed that groups differed on marital status ($p < .05$). Compared to healthy controls, forensic patients with ADHD and at risk controls reported more often to be single. Healthy controls were more often married or in a relationship at the time of the study.

Regarding correlations within the whole sample, social support was positively related to secure attachment, and negatively related to antisociality. Secure attachment was negatively related to all externalizing behaviors, whereas preoccupied attachment was only (positively) related to hostility. Also, fearful attachment was positively related to all externalizing behaviors, whereas dismissive attachment was positively related to aggression, antisociality, and anger.

Group differences in social support, attachment styles, and externalizing behaviors

To test group differences in social support, attachment, and externalizing behaviors, we conducted two MANOVA's. Results of the multivariate analyses indicated significant differences between groups in the model examining social support and attachment styles combined (Pillai's Trace = .50, $F = 5.66$, $df = (10,170)$, $p < .001$, $\eta_p^2 = .25$), and the model examining all externalizing behaviors together (Pillai's Trace = .62, $F = 10.03$, $df = (8,178)$, $p < .001$, $\eta_p^2 = .31$). As such, we interpreted the results of the follow-up univariate analyses to identify on which of the individual variables group differences were significant.

Results of the univariate analyses showed that groups differed in all attachment styles and externalizing behaviors, but not in social support (see Table 2). In line with the first hypothesis, post-hoc analyses using bootstrapping showed that forensic patients with ADHD reported lower levels of secure attachment, higher levels of all three insecure attachment styles, and higher levels of all externalizing behaviors compared to healthy controls. Similar results were found for comparisons between forensic patients with ADHD and at risk controls, except these groups did not differ on secure and preoccupied attachment, or on hostility.

Table 1. Background characteristics forensic ADHD patients and controls, and bivariate correlations within the entire sample (*N*=94)

	Healthy controls (*n* = 32)	At risk controls (*n* = 30)	Forensic ADHD patients (*n* = 32)	F(2,91)
Age *M (SD)*	33.84 (9.98)	36.47 (11.06)	35.34 (8.92)	0.54
Education *n* (%)				
Low	17 (53.1)	10 (33.3)	19 (59.4)	Fisher's exact
Moderate	12 (37.5)	16 (53.3)	10 (31.3)	test = 4.67
High	3 (9.4)	4 (13.3)	3 (9.4)	
Marital status *n* (%)				
Single	10 (31.3)	12 (40.0)	13 (40.6)	Fisher's exact
Married/relationship	22 (68.8)	14 (46.7)	13 (40.6)	test = 9.42*
Divorced/other	0 (0.0)	4 (13.3)	6 (18.8)	
Network members *M* (*SD)*	5.03 (2.31)	5.10 (2.44)	5.56 (2.86)	0.41

	1.	2.	3.	4.	5.	6.	7.	8.
1. Social support	-							
2. Secure attachment	.31*	-						
3. Preoccupied	-.05	-.20	-					
4. Fearful	-.20	-.68**	.45**	-				
5. Dismissive	-.15	-.23*	-.10	.40**	-			
6. Aggression	-.14	-.34*	.03	.39**	58**	-		
7. Antisociality	-.22*	-.27*	.14	.24*	.40**	.52**	-	
8. Anger	-.18	-.38*	.47**	.46**	.52**	.76**	.50**	-
9. Hostility	-.11	-.33*	.57**	.54**	.11	.27*	.22*	.36**

*. $p < .05$; **. $p < .001$

Table 2. Results of the MANOVA's of social support and attachment, and externalizing behaviors (N = 94)

	Healthy controls (n = 32)		'At risk' controls (n = 30)		Forensic ADHD patients (n = 32)		
	M (*SD*)	95% CI	*M* (*SD*)	95% CI	*M* (*SD*)	95% CI	*F* (2,88)
Social support	0.73 (0.18)	-0.25; -0.02	0.61 (0.25)	-0.17; 0.12	0.59 (0.30)	0.48; 0.68	2.89
Attachment							
Secure	3.87 (0.67)^{b}	-0.85; -0.19	3.65 (0.68)^{ab}	-0.64; 0.04	3.34 (0.67)^{a}	3.12; 3.58	4.98*
Preoccupied	2.15 (0.61)^{a}	0.65; 1.42	2.95 (0.81)^{b}	-0.15; 0.69	3.19 (0.91)^{b}	2.87; 3.49	14.66**
Fearful	2.44 (0.79)^{a}	0.71; 1.56	2.84 (0.78)^{b}	0.34; 1.12	3.58 (0.88)^{c}	3.25; 3.86	16.04**
Dismissive	3.26 (0.64)^{a}	0.25; 0.92	3.29 (0.64)^{a}	0.23; 0.90	3.86 (0.70)^{b}	3.61; 4.10	8.62**
Externalizing behavior	*M (SD)*	95% CI	*M* (*SD*)	95% CI	*M* (*SD*)	95% CI	*F* (2,91)
Aggression	2.18 (0.87)^{b}	0.64; 1.47	1.76 (0.68)^{a}	1.12; 1.86	3.24 (0.83)^{c}	2.95; 3.54	28.81**
Antisociality	1.45 (0.53)^{a}	0.16; 0.68	1.45 (0.40)^{a}	0.17; 0.64	1.85 (0.55)^{b}	1.67; 2.05	6.85*
Anger	1.98 (1.00)^{a}	1.04; 2.07	2.20 (1.04)^{a}	0.78; 1.87	3.53 (1.13)^{b}	3.15; 3.91	20.07**
Hostility	1.91 (0.86)^{a}	0.89; 1.94	2.76 (1.11)^{b}	-0.08; 1.14	3.31 (1.27)^{b}	2.87; 3.75	13.40**

Note. Superscripts a, b, c show significant differences between the groups based on the results of the post hoc multiple comparisons using bootstrapping.
Note. The reported 95% confidence intervals for healthy and at risk controls are the parameter estimates of the mean differences compared to the Forensic ADHD patients

*. $p < .05$; **. $p < .001$

Unique associations between social support, attachment styles, and externalizing behaviors
Results of the hierarchical regression analyses using bootstrapping are reported in Table 3. Findings from Step 1 showed a negative main effect of the at risk controls and a positive effect of forensic patients with ADHD on aggression. This suggests that compared to healthy controls, at risk controls reported lower levels of aggression, whereas forensic patients with ADHD reported more aggression. In Step 2, attachment styles were added to the model. Results showed that dismissive attachment was positively related to aggression within the whole sample, indicating that higher levels of dismissive attachment were associated with more aggression. Finally, in Step 3, we examined two-way interactions between group and attachment styles yielding a significant interaction between group and preoccupied attachment on aggression (i.e., sr^2 forensic patients with ADHD = .05; sr^2 at risk controls = .02). Simple slopes analyses showed that there was a negative association between preoccupied attachment and aggression for healthy controls (*b* slope = -0.60, *SE* = 0.16, CI 95% [-0.91; -0.29]; see Figure 1a), such that when levels of preoccupied attachment increased, self-reported aggression decreased. For forensic patients with ADHD and at risk controls, no significant association between preoccupied attachment and aggression was found (i.e., *b* slope forensic patients with ADHD = 0.29, *SE* = 0.22, CI 95% [-0.16; 0.73]; *b* slope at risk controls = 0.02, *SE* = 0.21, CI 95% [-0.39; 0.43]).

Regarding associations with antisociality, main effects in Step 1 showed that social support was negatively associated with antisociality. This indicated that the more social support participants perceived, the lower their levels of self-reported antisociality were. Furthermore, there was a positive main effect of forensic patients with ADHD, indicating that this group reported more antisociality than healthy controls. Yet, when attachment styles were controlled for in Step 2, main effects of social support and group were no longer significant. Instead, only dismissive attachment was positively related to antisociality within the sample as a whole. Hence, participants who were more dismissively attached, reported more antisociality. Findings from Step 3 yielded no significant interaction effects between group and attachment styles on antisociality.

Next, we tested the models for anger. Similar to the previous outcomes, forensic patients with ADHD reported more anger than healthy controls (see Step 1). In Step 2, higher levels of dismissive attachment were found to be related to more anger in the entire sample. Finally, results of Step 3 suggested that there was a significant interaction between forensic patients with ADHD and secure attachment on anger (sr^2 = .04). Results of the simple slopes analyses showed a negative relationship between secure attachment and anger for healthy controls (*b* slope = -0.97, *SE* = 0.27, CI 95% [-1.50; -0.43]; see Figure 1b), such that when levels of secure attachment increased, self-reported anger decreased. For forensic patients with ADHD, the relationship between secure attachment and anger was not significant (i.e., *b* slope = 0.24, *SE* = 0.31, CI 95% [-0.38; 0.87]).

Finally, we tested the model for hostility. Findings from Step 1 showed that both forensic patients with ADHD and at risk controls reported higher levels of hostility than

healthy controls. Again, when controlled for attachment in Step 2, these group differences were no longer significant. Results of Step 2 further showed that both preoccupied and fearful attachment were positively associated with hostility in the entire sample. Hence, the higher participants' self-reported preoccupied and fearful attachment, the higher their self-reported hostility. Interactions between attachment and group in Step 3 were not significant. Moreover, no significant interaction effects were found in the models examining two-way interactions between group and social support on any of the externalizing behaviors.

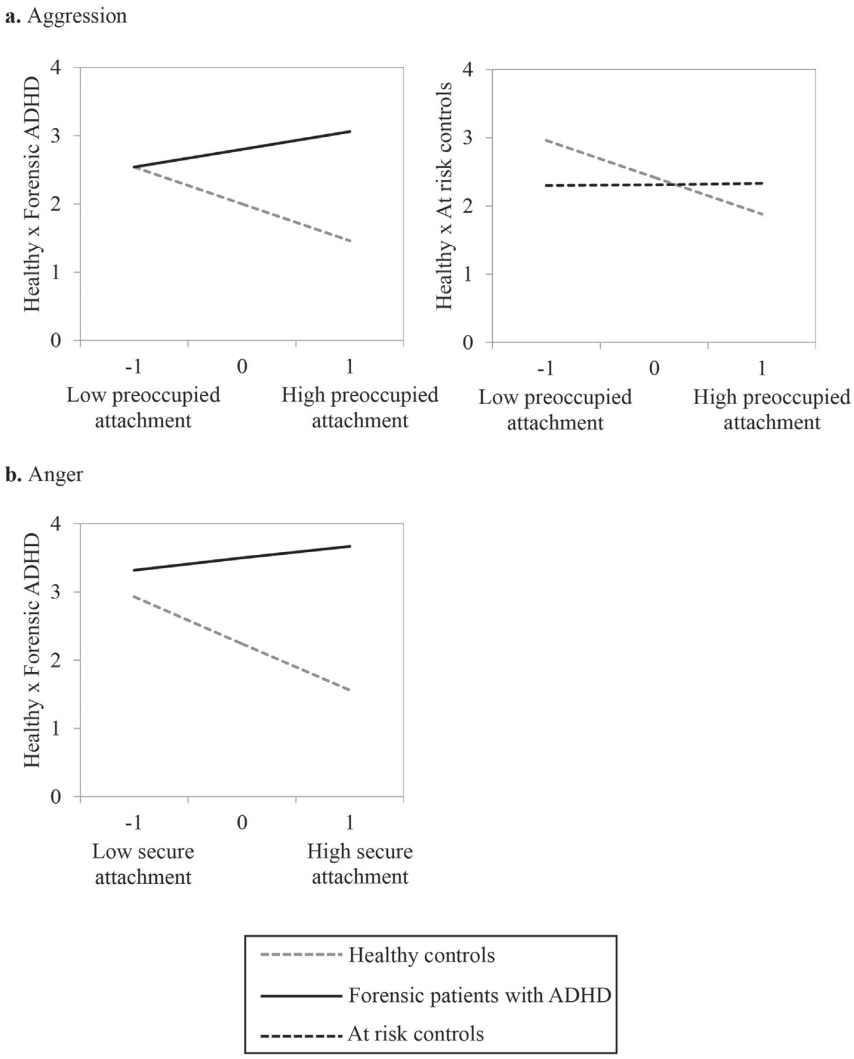

Figure 1. Interactions between groups and attachment on externalizing behavior

Table 3. Regression analyses of social support, attachment styles and externalizing behaviors using bootstrapping ($N = 91$)

	Aggression		Antisociality		Anger		Hostility	
	B(SE)	95% CI	*B(SE)*	95% CI	*B(SE)*	95% CI	*B(SE)*	95% CI
Step 1. R^2	0.39**		0.17*		0.34**		0.23**	
Constant	2.67 (0.30)		1.75 (0.16)		2.42 (0.41)		2.02 (0.35)	
At risk group	-0.52 (0.19)*	-0.89; -0.16	-0.05 (0.13)	-0.32; 0.20	0.05 (0.28)	-0.48; 0.64	0.77 (0.26)*	0.23; 1.28
Forensic ADHD	0.97 (0.21)*	0.53; 1.34	0.35 (0.13)*	0.09; 0.61	1.47 (0.28)*	0.87, 2.01	1.38 (0.27)*	0.79; 1.89
Social support	-0.68 (0.37)	-1.58; 0.05	-0.42 (0.19)*	-0.82; -0.05	-0.61 (0.51)	-1.54; 0.40	-0.16 (0.46)	-1.04; 0.82
Step 2. ΔR^2	0.15**		0.10*		0.14*		0.22**	
Constant	2.49 (0.30)		1.71 (0.17)		2.20 (0.42)		2.46 (0.34)	
At risk group	-0.51 (0.17)*	-0.89; -0.15	-0.10 (0.14)	-0.36; 0.18	0.10 (0.27)	-0.38; 0.67	0.29 (0.25)	-0.19; 0.80
Forensic ADHD	0.51 (0.23)*	0.05; 1.00	0.16 (0.17)	-0.17; 0.51	1.05 (0.30)*	0.46; 1.64	0.50 (0.33)	-0.15; 1.17
Social support	-0.31 (0.37)	-1.34; 0.41	-0.21 (0.21)	-0.62; 0.22	-0.05 (0.53)	-1.06; 0.98	-0.11 (0.40)	-0.88; 0.70
Attachment								
Secure	-0.28 (0.14)	-0.55; 0.01	-0.20 (0.11)	-0.44; 0.00	-0.22 (0.19)	-0.62; 0.16	0.12 (0.19)	-0.26; 0.50
Preoccupied	0.08 (0.12)	-0.27; 0.24	0.11 (0.08)	-0.04; 0.26	-0.11 (0.16)	-0.42; 0.22	0.42 (0.16)*	0.12; 0.73
Fearful	-0.02 (0.12)	-0.27; 0.20	-0.13 (0.10)	-0.36; 0.05	0.18 (0.19)	-0.20; 0.56	0.54 (0.20)*	0.14; 0.90
Dissmissive	0.53 (0.11)*	0.29; 0.73	0.26 (0.10)*	0.08; 0.46	0.50 (0.18)*	0.12; 0.86	-0.15 (0.21)	-0.63; 0.20
Step 3. ΔR^2	0.09*		0.07		0.07		0.08	
Attachm x at risk								
Secure	0.49 (0.36)	-0.26; 1.12	0.08 (0.27)	-0.48; 0.63	0.71 (0.59)	-0.41; 1.87	0.12 (0.49)	-1.92; 1.10
Preoccupied	0.62 (0.27)*	0.18; 1.23	-0.35 (0.20)	-0.77; 0.05	0.71 (0.39)	-0.09; 1.46	0.52 (0.39)	-0.19; 1.32
Fearful	0.20 (0.31)	-0.46; 0.72	0.22 (0.30)	-0.33; 0.82	-0.12 (0.66)	-1.31; 1.24	-0.11 (0.54)	-1.17; 0.94
Dissmissive	0.11 (0.31)	-0.38; 0.86	-0.25 (0.29)	-0.90; 0.23	0.39 (0.52)	-0.67; 1.28	-0.69 (0.47)	-1.67; 0.16

Table 3. Continued

	Aggression		Antisociality		Anger		Hostility	
	B(SE)	95% CI	*B(SE)*	95% CI	*B(SE)*	95% CI	*B(SE)*	95% CI
Attachm x F ADHD								
Secure	0.44 (0.32)	-0.21; 1.05	0.00 (0.29)	-0.62; 0.50	1.21 (0.44)*	0.44; 2.45	0.77 (0.44)	-0.18; 1.62
Preoccupied	0.88 (0.26)*	0.33; 1.37	-0.15 (0.19)	-0.56; 0.21	0.19 (0.37)	-0.60; 0.86	0.03 (0.37)	-0.74; 0.73
Fearful	0.42 (0.31)	-0.18; 1.04	0.32 (0.23)	-0.20; 0.75	0.62 (0.43)	-0.20; 1.48	0.77 (0.44)	-0.02; 1.65
Dissmissive	0.06 (0.34)	-0.80; 0.53	-0.30 (0.26)	-0.92; 0.14	0.25 (0.47)	-0.89; 0.91	-0.30 (0.51)	-1.52; 0.50

'At risk'= 'at risk' control group, Attachm = attachment, F ADHD = forensic ADHD patients

Note. At risk and Forensic ADHD are dummy variables with healthy controls serving as the reference group

Note. The two-way interactions between social support and groups on externalizing behaviors are not reported in this table, because none of these interactions were significant

*. $p < .05$; **. $p < .001$

3.4 DISCUSSION

This is the first study to examine associations between social support, attachment styles and externalizing behavior in forensic patients with ADHD. Consistent with previous research, our findings provided support for the notions that ADHD is associated with externalizing behavior and psychosocial impairment, including insecure attachment (i.e., preoccupied, fearful, and dismissive attachment), but not to poor social support. In line with our hypotheses, findings indicated that forensic patients with ADHD have higher levels of externalizing behaviors and insecure attachment, and lower levels of secure attachment compared to both healthy and (to a lesser extent) psychiatrically at risk controls. In general, insecure attachment was associated with higher levels of externalizing behaviors, including aggression, antisociality, anger, and hostility. Moreover, for antisociality and hostility, insecure attachment seemed to be a better predictor than risks inherent to (forensic) ADHD. Finally, we found no support for associations between social support and externalizing behavior when accounting for attachment.

Specifically, multivariate regression analyses showed that controlled for social support and group, only dismissive attachment was positively related to more antisociality. In contrast, hostility was only positively associated with higher levels of both fearful and preoccupied insecure attachment, indicating that having a negative view of the self is associated with more hostile cognitions. These findings highlight the important role that insecure attachment can play in mental health problems. This is striking, given that in many treatment programs, discussing or adjusting patients' attachment patterns is not yet an explicit treatment goal.

Implicitly, attachment insecurity in treatment has received much scientific and clinical attention. For example, patients' insecure attachment is recognized to complicate the forming of a healthy therapeutic alliance, which in turn, is associated with poorer treatment progress (Martin, Garske, & Davis, 2000; Meyer & Pilkonis, 2001; Satterfield & Lydodon, 1998). It is therefore key that therapists help patients' overcome attachment difficulties, but this process is often described as going through specific ways of interacting with the patient, and thus through the therapeutic relationship itself (see for example; Pearlman & Courtois, 2005). Whether therapists succeed in overcoming these difficulties then also depends on characteristic related to the therapist, such as own attachment style, warmth, and ability to empathize with patients (e.g., Lambert & Barley, 2001). We therefore argue that approaches for targeting insecure attachment in treatment can be improved by standardization. Future research may want to expand on this idea and examine whether and how attachment styles can be targeted in treatment explicitly.

Furthermore, similar to previous studies on clinical and offending samples (Ogilvie et al., 2014), our findings supported the idea that in particular dismissive attachment is associated with externalizing behavior. Hence, of the four attachment styles, only higher levels of dismissive attachment were related to more aggression and anger. Dismissive

attachment thus seems to be a general risk factor for externalizing behavior, relevant to forensic patients with ADHD, and healthy and at risk controls.

In contrast to our hypotheses, groups neither differed in social support, nor was social support related to externalizing behavior when accounting for group and attachment styles. Although results on antisociality indicated that social support was negatively associated with antisociality, this relationship was not significant when attachment was taken into account. We argue that this might explain some of the mixed findings in previous studies on the role of social support in forensic psychiatric patients, as it illustrates that accounting for individual factors associated with social support may lead to different conclusions. Alternatively, the way in which we assessed social support may have biased the current findings regarding the relationship with externalizing behavior. In this study, social support mostly reflected the availability of social support. However, it has been suggested that not social support availability, but rather social support *quality* is associated with fewer externalizing behavior in forensic psychiatric patients (Skeem et al., 2009). In contrast, other work showed that social support availability is also positively related to certain risks for externalizing behavior, such as substance use (Spohr, Suzuki, Marshall, Taxman, & Walters, 2016).

Our finding that forensic patients with ADHD did not differ in perceived social support from healthy and at risk controls, can be explained in several ways. First, it can be argued that this indicates that in general, people tend to rely on a relatively small number of close network members (i.e., on average, less than 5) for support. This is in line with research on 'core discussion networks', which suggests that people generally rely on about 2 network members to discuss important personal matters with (De Cuyper, Dirkzwager, Völker, Van der Laan, & Nieuwbeerta, 2012; McPherson, Smith-Lovin, & Brashears, 2006). Second, it is possible that the control groups were less in need of others' support than forensic patients with ADHD, and therefore reported a small number of network members on whom they rely on for support (i.e., similar to the number reported by forensic patients with ADHD). Yet, if needed, controls may have more people within their network to whom they can actually turn to for support. Finally, our results may have been influenced by small differences in assessment of social support between samples. Patients with ADHD filled-out the social support questions together with a researcher, whereas the control groups filled these questions out by themselves. Because participants were asked to answer questions about every network member that they listed, participants from the control groups may have listed fewer network members to save time and thus may not reflect their full social support network. In contrast, forensic patients with ADHD may have felt more pressure to list more network members.

Counter to our hypothesis, neither social support, nor attachment styles were more strongly associated with externalizing behaviors in forensic ADHD patients compared to control groups. Instead, only attachment styles were differently associated with externalizing behavior between groups. Specifically, higher levels of preoccupied and secure

attachment styles in healthy controls were associated with lower levels of aggression and anger, respectively. As such, it can be argued that these attachment styles can protect healthy individuals from engaging in these externalizing behaviors. Yet, these results should be interpreted cautiously, as we did not formulate hypotheses about these interactions and effect sizes of these interactions were small.

Finally, comparing the three groups on attachment and externalizing behaviors, there were some additional findings which were not hypothesized prior to data analyses. We found that although forensic patients with ADHD had higher levels of all insecure attachment styles and externalizing behaviors compared to healthy controls, forensic patients did not differ from at risk controls in hostility and preoccupied attachment. Because it has been suggested that preoccupied attachment is more strongly associated with internalizing behavior (Dozier et al., 2008), the latter finding might reflect the fact that forensic patients with ADHD and at risk controls show some overlap in internalizing problems. In particular, because self-reported mental health symptoms of at risk controls, most often comprised internalizing symptoms, such as anxiety and mood related symptoms. Alternatively, together with our finding that preoccupied attachment was only positively associated with hostility when controlled for group and social support, these findings can also indicate that hostility in part comprises internalizing behavior. In this study, higher levels of hostility included cognitions related to bitterness and ill will (Bryant & Smith, 2001), but participants had not necessarily acted upon these cognitions.

Our findings should be interpreted against the backdrop of several study limitations. First, because results were based on cross-sectional data, it is possible that poor social support and insecure attachment were the result of severe externalizing behavior. In particular, this might have been the case for forensic patients with ADHD, because their offending might have led to the loss of social contacts in the past. Second, because we only made use of self-reports, the data might have been subject to social desirability responding (Van de Mortel, 2008). Again, social desirable responding was most likely for forensic patients with ADHD, because they filled out the questions together with a researcher. Third, we made use of the Attachment Style Questionnaire (Van Oudenhoven et al., 2003) to assess adult attachment styles. As noted, this instrument assesses attachment styles from a dimensional perspective, so that individuals can score high on more than one of the attachment styles. Hence, we examined associations with externalizing behavior for individuals scoring higher or lower on a particular style of attachment, which is different from previous studies on attachment and psychopathology in which participants were classified as being either securely, or insecurely (preoccupied, fearful, or dismissive) attached (e.g., Ogilvie et al., 2014; Storebø et al., 2016). This should be kept in mind when interpreting the current findings on the role of attachment in explaining externalizing behavior. Fourth, because of the small sample size and limited statistical power, we were unable to adequately test for associations with small effect sizes (Cohen, 1992). Future studies should therefore replicate these findings in larger samples.

Moreover, because of the small number of participants in each group, we could not examine associations between social support, attachment and externalizing behavior within groups. Particularly within forensic patients with ADHD, this might have yielded different results, because psychiatric and psychosocial problems are highly heterogeneous within these patients (Scully, Young, & Bramham, 2014; Willcutt et al., 2012). Future research may want to examine this further, and additionally, focus on how social support and different attachment styles interact in their relationship with externalizing behavior. That is, it can be argued that for patients with higher levels of secure attachment, social support can buffer against externalizing behavior, whereas for individuals with higher levels of insecure attachment this is not the case. A final limitation concerns the fact that we included forensic patients with ADHD who were receiving treatment for a longer period of time, which may have affected our findings. Patients who have received treatment for some time are expected to have learned to better regulate emotions and (externalizing) behavior. Yet, comparing these patients with patients who just entered treatment, showed no difference in self-reported externalizing behaviors or on any of the other variables of interest.

3.5 CONCLUSIONS

To sum up, we showed that insecure attachment styles are associated with externalizing behavior. For some externalizing behaviors, this association existed above and beyond the relationship with other psychopathological risk factors that distinguished the different study groups. In particular, dismissive attachment was a risk factor for externalizing behaviors in both control groups and forensic patients with ADHD. Preoccupied and fearful attachment were related to more hostility, whereas social support was not associated with externalizing behavior in these samples. Although replication is needed, these findings underline the importance of insecure attachment and its association with particular problem behavior. At the very least, our findings call for more awareness in forensic psychiatric care regarding the finding that enhancing social support might not always be enough to reduce externalizing behaviors for insecurely attached patients. Rather, we suggest that extra attention should be given to the way in which patients view themselves and others, perceive and experience emotions in interpersonal relationships, and the extent to which they are able to trust and rely on others if needed.

This chapter is based upon: Houtepen, J.A.B.M., Sijtsema, J.J., Van der Lem, R., & Bogaerts, S. (Submitted). Conducting research in 'hard-to-reach' populations: A review of the literature and a case example of studying forensic outpatients with ADHD.

Chapter 4

Conducting research in 'hard-to-reach' populations: A review of the literature and a case example of studying forensic outpatients with ADHD

ABSTRACT

Previous research has focused on how to include and actively engage "hard-to-reach" populations, but specific recommendations for forensic psychiatric samples are lacking. In this review, it was aimed to examine the feasibility of previous recommendations to engage a sample of forensic outpatients in scientific research, and to provide practical recommendations for researchers in forensic psychiatry. Using a pilot and follow-up study on 52 forensic outpatients with ADHD and their social networks, we provide a case example on how previous recommendations were incorporated in our research and explain to what extent these were feasible in studying patients in a forensic outpatient center. A tailor-made research design was developed based on specific patient and contextual characteristics. Despite the simplicity of this design, patients' psychiatric and functional impairment complicated participant inclusion, (standardized) assessment, and research compliance. Furthermore, permission to contact patients' network members and receiving ongoing support of clinical professionals were challenging. In contrast, clinical experience, visibility within the outpatient center, and taking an individualized hands-on approach in supporting patients' and clinical professionals' collaboration, were important for participant inclusion and compliance. Investment in relationships with patients, their social networks, and clinical professionals is therefore vital to enhance research participation among forensic psychiatric patients.

4.1 INTRODUCTION

A growing body of (mental) health care research focuses on issues related to studying populations that are in general characterized as "hard-to-reach" (for reviews see: Bonevski et al., 2014; Ellard-Gray, Jeffrey, Choubak, & Crann, 2015; Woodall, Morgan, Sloan, & Howard, 2010). In this regard, hard-to-reach refers to populations that are difficult to include and actively engage in research for various reasons, and therefore, are often excluded from general studies on (mental) health care. Research focusing on studying hard-to-reach populations aims to make researchers more aware of challenges associated with conducting research in these populations and to provide recommendations to overcome these challenges. More knowledge on conducting studies on hard-to-reach populations might increase the number of studies focusing on these populations, and subsequently, can enhance scientific knowledge on similar hard-to-reach, and therefore often "difficult" patients seen in clinical practice. Ultimately, this enhances the external validity of (mental) health care research.

Most research on hard-to-reach populations has been conducted in the US and focused on the underrepresentation of ethnic minorities in clinical research (Bonevski et al., 2014). Yet, underrepresented and hard-to-reach study populations also include other socially disadvantaged groups, such as "the homeless, and transient, chronically mentally ill, high school drop-outs, criminal offenders, prostitutes, juvenile delinquents, gang members, runaways and other "street people"" (Lambert & Wiebel, 1990: pp1). The most difficult study populations concern individuals falling into more than one of the aforementioned categories, which is often the case for forensic psychiatric patients. Therefore, not surprisingly, knowledge on how to include and actively engage forensic psychiatric patients into research is scarce. With the current article, we aim to increase this knowledge by examining previously identified challenges and recommended solutions of research in other hard-to-reach populations, and provide insight into their feasibility in a sample of forensic outpatients with Attention-Deficit Hyperactivity Disorder (ADHD) and their social networks.

Previous study challenges for hard-to-reach populations have been divided into participant characteristics, the families/communities of certain groups, health service factors, particular research processes, and general practical issues (Brown, Marshall, Bower, Woodham, & Waheed, 2014). Recommendations to enhance (active) research participation among these populations differ widely and their effectiveness in different samples is not yet known (Bonevski et al., 2014). Evidently, the feasibility of these recommendations depends partly on specific participant- and context related challenges, and therefore it has been advised that tailor-made research designs are developed for specific minority groups, and tested in pilot studies before applying them to larger populations (Bonevski et al., 2014). Additionally, we suggest that research experiences

describing these tailor-made study designs and their feasibility should be shared actively among researchers.

To this end, we use a pilot and follow-up study that were originally developed to examine treatment progress in Dutch forensic outpatients with ADHD, to explain how previous recommendations were incorporated in a tailor-made study design for this particular sample. In doing so, we provide a practical case example for researchers studying forensic outpatients with ADHD or similar forensic psychiatric samples, and describe to what extent recommendations from the literature were feasible in studying patients in a forensic outpatient center. In the following, we first describe the challenges that we expected to meet based on previous research on hard-to-reach populations and forensic psychiatric samples in general. Next, we summarize relevant recommendations from previous research and elaborate on the recommendations and adaptions we incorporated in the design of our study. Finally, we discuss the feasibility of previous study recommendations and our adaptations in the current study population and provide additional recommendations for future studies.

Studying forensic outpatients with ADHD: Expected challenges

Inherent to hard-to-reach study samples, relatively little is known about forensic patients with ADHD (e.g., Young et al., 2014). Yet, it has been indicated that forensic patients with ADHD often struggle with complying with treatment and that treatment progress differs greatly between patients (e.g., Stoel, Houtepen, Van der Lem, Bogaerts, & Sijtsema, 2018). The research design described in our case example was therefore originally developed to test patient and contextual factors associated with treatment compliance in forensic patients with ADHD. Below, we describe the research challenges that we expected to meet in conducting this research. In accordance with recent reviews (Brown et al., 2014; Waheed, Hughes-Morley, Woodham, Allen, & Bower, 2015), we discuss these challenges into three overarching themes: participant-related factors, family/community related factors, and health service related factors.

Participant factors

Participant-related challenges were expected to be related to ADHD symptoms and to the psychiatric complexity and enhanced functional impairment often seen in forensic samples. That is, ADHD is a heterogeneous and often pervasive disorder in terms of the expression of core symptoms, psychiatric comorbidity, and psychosocial impairment (American Psychiatric Association, 2013; Willcutt et al., 2012). Lifelong social, educational/employment (Young, Toone, & Tyson, 2003), financial, and housing problems (Antshel & Barkley, 2009) are commonly reported among patients with ADHD. Moreover, comorbid behavioral, mood- and substance use disorders are highly prevalent (Sobanski, 2006). These comorbidity rates are even higher in patients with a criminal history (Ginsberg, Hirvikoski, & Lindefors, 2010; Scully, Young, & Bramham, 2014). Similarly, offenders

with ADHD are more impaired in psychosocial functioning than non-offending patients with ADHD (Garcia et al., 2019). These and other characteristics of forensic (out)patients with ADHD pose a number of challenges for research.

First, previous studies on hard-to-reach samples showed that the severity of patients' psychiatric problems influence patients' willingness to participate in research and the willingness of clinical professionals to recruit patients for inclusion (Hughes-Morley, Young, Waheed, Small, & Bower, 2015). Patients with severe functional impairment are also less likely to participate in research, because of practical issues such as financial constraints, lack of time, or transportation issues (Bonevski et al., 2014; Tcheremissine, Rossman, Castro, & Gardner, 2014; Paskett et al., 2008).

Second, negative attitudes to treatment have been identified as barriers for the recruitment of patients into research (Brown et al., 2014), which likely exist in forensic patients with ADHD who receive court-ordered treatment. At least, poorer treatment motivation is a problem in some patients (Woicik, Van der Lem, Sijtsema, & Bogaerts, 2017).

Third, concerns about confidentiality, or the misuse of information may be present, as well as mistrust of research, researchers, or authority figures in general. These are all barriers for research participation in hard-to-reach samples (Bonevski et al., 2014; Woodall et al., 2010). Forensic patients with ADHD have often encountered adverse interpersonal experiences throughout their lives, resulting in attachment problems and other interpersonal difficulties (Houtepen, Sijtsema, Van der Lem, Van Hooydonk, & Bogaerts, 2019; Storebø, Rasmussen, & Simonsen, 2016), which can influence their ability to trust others.

Fourth, because of core ADHD symptoms, such as impulsivity and disorganization, high no-show and dropout rates can occur in treatment and research on patients with ADHD (Buitelaar, Posthumus, Bijlenga, & Buitelaar, 2019; Rich et al., 2014). Evidently, this is more likely in research designs with follow-up measures or a heavy participant burden. Severe functional impairments such as housing problems, can further enhance difficulties in selecting and monitoring participants, because home addresses, cell-phone numbers, and other contact information are frequently changing (Bonevski et al., 2014). Additionally, forensic patients are generally more difficult to follow-up, because they frequently move between different custodial settings (e.g., from prison to probation services in community settings, and back to prison) (Fitzpatrick et al., 2010). Moreover, substance abuse, antisocial personality traits, and criminal history are risk factors for treatment dropout (O'Brien, Fahmy, & Singh, 2009) and highly prevalent in forensic patients with ADHD. Some of these factors were also identified as risks for research dropout in other hard-to-reach samples (Loue & Sajatovic, 2008).

Finally, regarding difficulties with data collection more generally, lower literacy levels have been identified as a barrier for research inclusion. Poor literacy levels can affect participants' ability to provide informed consent and complicate the choosing of

appropriate assessment tools (Brown et al., 2014; Bonevski et al., 2014). Because poorer intellectual functioning is common in forensic patients (Wilson & Hernstein, 1985), this is something to take into account in the current sample.

Family/community factors

Some challenges related to the recruitment of patients' social network members were also expected. The social environment of forensic patients is a significant factor in forensic risk assessment and may affect treatment progress (e.g., Lindqvist & Skipworth, 2000). Therefore, it is important to include patients' social networks in research on forensic psychiatric care. To our knowledge, no studies exist that describe how to engage social network members of forensic psychiatric patients into research. Scientific knowledge on the social networks of forensic psychiatric patients is mainly focused on the presence of criminogenic risk factors, such as network members' own criminal history, mental health difficulties, and substance abuse (e.g., Ter Haar-Pomp, Spreen, Bogaerts, & Volker, 2014). These criminogenic risk factors are often present in a high number of patients' social network members (Garcia et al., 2019). Therefore, risk factors for research dropout in forensic patients with ADHD (e.g., severe psychopathology, and criminal history) may also apply to their social networks. Furthermore, because it is quite common that patients with ADHD experience difficulties with social network members (Eakin et al., 2004), forensic patients with ADHD may have few individuals within their social networks who can stimulate treatment compliance. This may also hold for research compliance. Previous work also identified issues related to negative attitudes towards mental health problems (Brown et al., 2014) and towards mental health care in particular by the social network. These negative attitudes can lower motivation in social network members to participate in research.

Health service factors

Participant recruitment via health services is a relatively effective recruitment strategy for hard-to-reach samples (Uybisco, Pavel, & Gross, 2007). However, barriers experienced by clinical professionals to enroll patients into research are frequently reported challenges. Professionals may feel that they ask too much of patients, are too busy to engage in extra tasks for researchers, or simply do not see the importance of conducting research (Paskett et al., 2008). Misconceptions about the research design and therefore experiencing difficulties in recruiting indicated patients, has also been reported as a barrier by professionals (Woodall et al., 2010). Furthermore, in a study on the underrepresentation of ethnic minorities (Thompson & Neighbors, 1996), it was noted that some individuals are less likely to be included in research, because they are considered a risk for the research design or the researchers. For example, some individuals are considered too violent and are therefore not included in research. Such perceptions can create sampling biases and should thus be avoided. Overcoming these referral and recruitment issues is relevant because

patients rely heavily on professional opinions in their decision and motivation to participate in research (Howerton et al., 2007; Zullino, Conus, Borgeat, & Bonsack, 2003).

Finally, in studying patients within health care services, researchers should consider that research designs depend to some degree on the organizational structures and rules within these services (Abrahms, 2010; Moore & Miller, 1999). For example, issues related to confidentiality and anonymity of patients can complicate accessing participants (and their social networks) via health care services. With regard to forensic psychiatric services, researchers can struggle with setting up a rigorous research design, while providing security and complying with safety issues in forensic care (i.e., keeping patients' offending risk as low as possible) (Fitzpatrick et al., 2010; Lindqvist & Skipworth, 2000). Therefore, some research techniques, such as participant randomization are more difficult to apply (Feder, Jolin, & Feyerherm, 2000). Finally, getting to know the organizational structures and rules of health care services, and building relationships with these services, are lengthy and time-consuming processes (Ellard-Gray et al., 2015).

Recommended research strategies

To overcome many of these challenges, a comprehensive, multipronged approach across all stages of research is needed (Bonevski et al., 2014). Specifically, because different challenges are likely to be interlinked, so are the provided solutions to particular problems (Waheed et al., 2015). For example, to include highly impaired patients, implementing a simple and flexible research design with few follow-up measures not only helps motivate patients to participate, but also lowers referral barriers of clinical professionals. Patients' functional barriers for research participation can be overcome by reimbursing traveling costs, providing transportation, and appropriate incentives and gifts, while planning flexible research appointments (e.g., right before or after treatment appointments, during weekends and evenings), on locations where participants already congregate (Bonevski et al., 2014; Ellard-Gray et al., 2015; Waheed et al., 2015). Multiple tracking methods (via telephone, email, post-address, and possible contact persons) and personal reminders for research appointments via various contact forms, can further decrease research no-show and dropout (Bonevski et al., 2014; Ellard-Gray et al., 2015; Meyers, Webb, Frantz, & Randall, 2003). Additionally, many of these strategies help in building solid relationships with participants and boosting their trust in the study.

Moreover, keeping a participant-centered approach during the entire research process is highly important in studying hard-to-reach populations (Bonevski et al., 2014; Ellard-Gray et al., 2015; Moore & Miller, 1999; Waheed et al., 2015). This is likely easier to obtain with the help of community partners, family members, clinical professionals, or other 'insiders' who know the patients and can act as gatekeepers. Researchers can also be trained in working sensitively with the research sample of interest. Furthermore, providing a caring study environment (Taylor, 2009) and stressing the benefits of a study for patients and treatment in general (rather than stressing the academic benefits), were identified as

important motivators for patients and clinical professionals. Both can stimulate active study participation and enhance support in clinical professionals (Bonevski et al., 2014; Ellard-Gray et al., 2015; Moore & Miller, 1999; Waheed et al., 2015; Woodall et al., 2010).

Other strategies to lower research barriers and enhance support in clinical professionals, include employing them as recruitment officers and providing them with external incentives, such as payments for participant recruitment (Bonevski et al., 2014). Developing patient materials that can be distributed directly to potential participants without the help of clinical professionals can avoid referral issues altogether (Howerton et al., 2007). Moreover, making use of existing routine care pathways to recruit participants can save time and efforts for everyone involved (Waheed et al., 2015). Finally, two relevant strategies to enhance data collection methods in difficult samples include simplifying and shortening study materials for individuals with lower literacy levels and making use of community-wide objective data (Bonevski et al., 2014). In conducting research in health care services, the latter implies using existing information stored in patient files. In the following, we illustrate how we applied these strategies in our research project.

4.2 AN ILLUSTRATIVE CASE STUDY

Research setting

At the forensic psychiatric outpatient center in the Netherlands where our research was conducted, a multimodal treatment program for adults with ADHD and offending behavior has been initiated. This program is in line with the Risk–Need–Responsivity model (Andrews, Bonta, & Hoge, 1990) and was certified by the Foundation for Top Clinical Mental Health Care. To obtain (and maintain) this certificate, conduct of research on the treatment program is mandatory. As such, research participation of the outpatient clinic and the clinical professionals working in the ADHD program was to some extent reinforced by an external incentive. In the treatment program, forensic patients with ADHD receive court-ordered or voluntary treatment that is primarily targeted at reducing risk of (re-)offending. All patients go through a standardized diagnostic procedure to assess ADHD, which includes psychological examination and a psychiatric interview. Thereafter, patients receive psychological treatment in different phases, starting with psychoeducation for ADHD and its relationship with externalizing behavior, followed by aggression regulation therapy (or cognitive-behavioral-therapy for other offending behavior) and schema-focused therapy, if indicated. Patients are offered 'side modules' including pharmacotherapy, practical support for social-, financial-, or work-related problems, and treatment for substance use disorders if applicable.

Study design

The original study was designed to examine treatment compliance in forensic patients with ADHD. First, we conducted a pilot study to test our research design. Here, we aimed to

include 10 patients who received treatment within the forensic ADHD program. Inclusion criteria were: male gender, a minimum age of 18, no intellectual disability, currently not in crisis or suffering from a psychotic episode, and an ADHD diagnosis. Because of ethical standards (i.e., patient privacy), to lower distrust in patients and to enhance support from clinical professionals working in the program, patients' therapists were asked to invite patients to participate. Patients who were interested received an information letter about the study aim and procedure from their therapist and were contacted via telephone by one of the researchers to plan a research appointment at the outpatient center. In the follow-up study, inclusion criteria were sharpened to adequately examine treatment compliance throughout the treatment program. Therefore, in the follow-up study patients were only included when they just finished the ADHD assessment and had not yet started treatment. During the follow-up study, we also used the existing routine care pathways to recruit participants by keeping track of all patients who entered the program, via weekly team meetings in which new patients are discussed. Patients' treatment progress was tracked via patient files and regularly face-to-face contact with therapists, to help therapists remember to include patients at the indicated time.

Participant burden was kept to a minimum, including one research appointment of approximately 2 hours, including a short break. We planned research appointments at a convenient time for patients, but were limited to opening hours of the outpatient center (hence, we had one option during the evenings every week and no options during weekends). All patients received an automatically sent text message 24 hours before the appointment to remind them about the research, and were asked whether they needed additional reminders. Some patients asked to receive an e-mail or telephone call from the researchers, sometimes a few hours prior to the research appointment. Participants received a gift voucher of either 5, 10 or 15 euro's based on their performance on one of the computer tasks. They were informed that the gift voucher would consist of a small monetary value, but did not know the exact amount. In the follow-up study, participants' travelling expenses were reimbursed.

During the research appointment, patients signed written consent and participated in three computer tasks. Also, a number of self-report questionnaires were assessed (short forms whenever possible). All study materials were checked for difficult and ambiguous items prior to the start of the data collection. One of the computer tasks was adjusted to the sample with regard to stimulus simplicity and trial duration. During the pilot study, patients filled out the questionnaires by themselves. In the follow-up study, all questions were read aloud and filled out together with the researcher. For the follow-up study, additional word lists in which the meaning of difficult language in the standardized questionnaires is explained were developed together with a senior practitioner working in the ADHD program and presented to patients. With this list, we aimed to increase the validity of the measures and lower patients' barriers for asking questions when research items were unclear. We also checked regularly whether patients correctly understood study instructions by asking them to explain these instructions in their own words. Information

on treatment progress was obtained from electronic patient files. Finally, patients' social networks were examined via structured interviews in which patients were asked to list (a maximum of 10) network members who currently played an important role in their lives. Social network members' were interviewed via telephone with patients' permission.

The study was conducted in accordance with the American Psychological Association's ethical guidelines and approved by the local Institutional Review Board at our university. The first and third author of this article were working as practitioners within the forensic ADHD treatment program at the time of the research. They thus knew the organizational structure and its rules, and had clinical experience in working with the patients. Moreover, they already had connections with the therapists working within the ADHD program and knew many of the patients receiving treatment at the time. Data collection for the pilot study took place from January 2016 to April 2016. Data collection for the follow-up study took place from October 2016 until April 2019. Next, we describe the feasibility of the study design based on our experiences and insights during this time of data collection.

4.3 INSIGHTS FROM THE CASE STUDY

Participant-related research experiences

In Table 1, background characteristics on patients' demographics, psychiatric - and functional impairment, treatment characteristics, and social networks are presented for patients from the pilot and the follow-up study separately. Despite differences in inclusion criteria, both study samples are best described as convenience samples: patients greatly differed in treatment phase and duration. Despite the simplicity of the study design, participant inclusion was challenging due to a number of previously identified patient characteristics and challenges experienced by clinical professionals in participant recruitment. We expected to finish data collection for the pilot study within 1 month. Yet, including (a minimum of) 10 males with ADHD who received treatment at the forensic outpatient center took 4 months to complete.

In the follow-up study, we included 41 patients with ADHD (i.e., 30.8%) of the total 133 male patients who entered the ADHD treatment program between 1 October 2016 and 31 December 2018. In line with recommendations from previous studies, we tried to avoid sampling biases and decrease research dropout by tracking (possible) study participants via multiple tracking methods (i.e., patient files and face-to-face meetings with therapists). Although this did not help to avoid these issues altogether, tracking the patient inflow in the ADHD treatment program during the follow-up study proved useful in providing insight into why patients were not included or dropped out (see Figure 1). This information was used to adjust the research design accordingly.

Table 1. Patient, treatment and social network characteristics (N = 52)

		Patients pilot *n* = 11	Patients follow-up study *n* = 41
		N (%)	*N* (%)
Demographics			
Age *M(SD;* range)		38.55 (7.79; 23 – 52)	34.4 (9.67; 19 – 61)
Dutch nationality		11 (100.0)	41 (100.0)
Foreign origin		2 (18.2)	5 (+2 unknown) (12.2)
Educational level	Low	8 (72.7)	25 (61.0)
	Moderate	3 (27.3)	16 (39.0)
	High	0 (0.0)	0 (0.0)
Marital status	Single, never married	3 (27.3)	21 (51.2)
	Relationship/married	5 (45.5)	17 (41.5)
	Divorced	3 (27.3)	3 (7.3)
DSM diagnoses			
Primary ADHD diagnosis		10 (90.0)	38 (92.7)
One comorbid psychiatric disorder		2 (18.2)	21 (51.2)
Multiple comorbid psychiatric disorders		7 (63.6)	14 (34.1)
Cluster B personality disorder		2 (18.2)	8 (19.5)
Cluster B personality disorder traits		5 (45.5)	7 (17.1)
Functional problems	Financial	6 (54.5)	10 (24.3)*
	Housing	4 (36.4)	4 (9.8)*
Treatment outpatient center (at time of data assessment)			
Court-ordered		3 (27.3)	11 (26.8)
Treatment duration in days (starting from the intake appointment) *M(SD;* range*)*		507.09 (674.16; 49 - 2339)	204.76 (183.03; 49 – 1029)
Treatment phase			
(Almost) finished ADHD assessment		0 (0.0)	14 (34.1)
Psychoeducation for ADHD		4 (36.4)	19 (46.3)
Aggression-regulation therapy		0 (0.0)	5 (12.2)
Schema-focused therapy		2 (18.2)	0 (0.0)
Long-term maintenance therapy		4 (36.4)	0 (0.0)
Other**		1 (9.0)	3 (7.3)

Table 1. Continued

	Patients pilot n = 11		Patients follow-up study n = 41	
	N (%)		*N* (%)	
Social network characteristics		Range		Range
M members (*SD*) / proportion of total (*SD*)				
Number of important network members	4.8 (2.7)	1 – 10	6.2 (2.8)	0 – 10
Allowed to interview	2.5 (1.9) / 0.6 (0.3)	0 – 6	1.5 (1.7) / 0.3 (0.3)	0 – 8
Interviewed	1.6 (1.4) / 0.4 (0.3)	0 – 4	1.2 (1.3) / 0.2 (0.3)	0 – 5
Contact with legal justice system	1.5 (1.4) / 0.3 (0.2)	0 – 4	1.5 (1.6) / 0.2 (0.2)	0 – 5
Treatment history	2.0 (2.3) / 0.5 (0.4)	0 – 8	1.3 (1.5) / 0.2 (0.2)	0 – 6
Financial or housing problems	0.9 (0.7) / 0.3 (0.3)	0 – 2	0.8 (1.3) / 0.1 (0.2)	0 – 6

* The number of patients with functional problems reflects those for which these problems were included in their DSM diagnoses. In the follow-up study, patients were asked whether they had experienced these problems in the past year. The number of patients with self-reported financial problems included n = 20, for housing problems n = 10.
**Includes treatment trajectories that do not fit the regular program. For example, patients who were only receiving treatment side-modules, or were on a waiting list for receiving treatment.
Note. One patient in the follow-up study dropped out of the study before he participated in the social network interview

For example, one of the reasons why patients were not included in the study was that a number of patients who had initially agreed to participate, dropped out of treatment or changed their minds about participating before the research appointment had taken place. These types of dropout happened, because in most cases the diagnostic phase took several months due to the severity of patients' psychiatric or psychosocial problems. According to our initial research design, we were only allowed to include patients when the diagnosis of ADHD was confirmed, and thus missed a number of possible participants. Moreover, almost half of the patients with ADHD were not invited to participate because they dropped out of treatment before the study started, or were referred to another mental health service. This is in line with research showing that the severity of patients' psychiatric and functional impairments and negative attitudes to treatment, can lower patients' willingness to participate in research. In the current study, this could thus indicate that a number of patients who were not included, were more impaired or less motivated for treatment than patients who did participate. Furthermore, some patients were not invited because they received treatment primarily for another mental health disorder or were considered not suitable by their therapist.

To address some of these referral and dropout issues, we loosened the inclusion criteria after approximately a year of data collection to also include patients before ADHD assessment was finished or when they (had) received treatment primarily for another diagnosis. Additionally, intellectual disability was dropped as an exclusion criterion: if

therapists considered a patient cognitively able to complete the study materials with the researchers' help, he was allowed to participate. After patients had agreed to participate, the research appointment was planned as soon as possible. Often, this appointment was scheduled immediately by therapists, instead of later by one of the researchers via telephone. In some cases, therapists also arranged a quick meeting with one of the researchers and the patient who wanted to participate, so that patients already knew who was going to conduct data collection. In these matters, having a flexible research design and working closely with therapists as patients' gate keepers were helpful for participant recruitment.

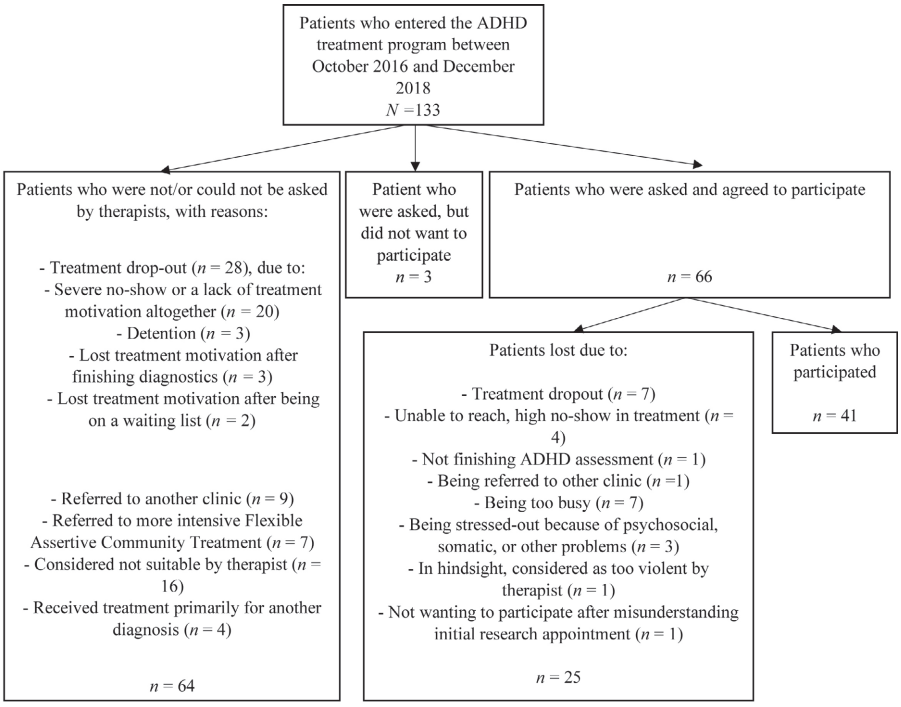

Figure 1. Participant inclusion follow-up study

Another participant-related challenge, which was not identified in previous research was that standardized research assessment can also be complicated by patients' psychiatric and behavioral problems, and by individuals' limited intellectual functioning. For example, during our research we experienced that a number of patients did not understand the aim of the study or did not care (e.g., participants wanted to provide consent without reading the information letter). Some patients confused the process of participating in scientific research with receiving psychological or psychiatric evaluation. From our clinical experience, we were able to respond sensitively to these behaviors, knowing whether or not to stop a research appointment, to press the alarm button, and when to refer patients

to their therapist (or contact therapists ourselves) regarding clinical information. Also in these matters, working closely with therapists from the treatment program was extremely helpful for both the study, and for patients' mental health care.

Next to simplifying and shortening study materials, which were both recommended in previous research, we experienced that filling out questionnaires together with patients was also of key importance in this sample. During the pilot study, we discovered that some study materials were too difficult for some patients, and that filling out the questionnaires by themselves easily led to biased responses. For example, some patients were inclined to take words too literally, or experienced difficulties in choosing their answer out of forced choice questions. Moreover, patients hardly asked any questions about the material themselves, which let us to speculate that this was embarrassing for some, whereas others may have misinterpreted the meaning of items without knowing. To overcome these problems, we developed a word list for difficult language that was presented to patients in order to increase the validity of the data. We also discovered that some functional impairments (e.g., financial problems) led to biased scores on some study materials, and incorporated standard questions about patients' motivation for some of the decisions they made during the study. In our experience, these were useful adjustments. Evidently, filling out questionnaires together with patients allowed us to answer patients' questions when needed. Yet, more importantly, this direct contact allowed for a working relationship in which we could better express our interest in patients and their individual stories, which further enhanced active research engagement. Additionally, this approach allowed for a better evaluation of whether patients filled out the questionnaires reliably. Making use of patient files was also useful in this regard, because comparing these data with patients' self-reports could indicate socially desirable responding.

Of note, during data assessment, we experienced that most patients enjoyed helping the researchers and felt good about doing something in return for the outpatient center and their therapists in particular. For some, this was more important than external incentives, such as the gift voucher that patients received for participating. A number of patients initially did not want to accept this voucher. Hence, positive reinforcement, taking time to emphasize the importance of their contribution (i.e., in previous literature: stressing the benefits of a study for patients and treatment in general), and expressing gratitude for their help were important research incentives.

Family/community related experiences

Because of ethical standards and to lower distrust of patients, patients had full control over which network members were contacted to participate in the study. Yet, receiving permission to contact network members and getting into contact with them via telephone were challenging. In total, 50 patients identified 299 network members who currently played an important role in their lives. Of the 88 network members we were allowed to contact, 64 (72.3%) participated in the study. These most often included parents,

romantic partners, and friends. Thirteen patients did not give permission to contact network members.

Similar to previous research, several of these network members (40.6%) had been in treatment for mental health problems, had been into contact with the legal justice system (26.6%), and/or experienced financial (39.1%) or housing problems in the past (15.7%). Although we included only a small proportion of patients' social network members, these characteristics suggest that our research approach was effective in including a representative social network sample of the patients who gave permission to contact network members. In addition, network members who were interviewed were generally highly involved and motivated to help patients when possible. We asked network members to rate the likelihood that they would provide patients with (different types of) support in the future, which most network members' rated as very likely. This suggests that including (prosocial) network members into research to support research compliance might also be helpful in future studies. Unfortunately, for patients who struggle with giving permission to contact others, this is not a viable strategy.

Health service related experiences

In studying patients within health care services, research designs and research processes depend to some degree on the organizational structures and rules within these services. During the years of data collection for our study, there were a number of structural organizational changes within the outpatient center, which complicated data collection. Furthermore, although an active research line was needed for the ADHD treatment program to honor its certificate for Top Clinical Mental Health Care, the outpatient center in which we conducted our study had little experience with scientific research. At times, these issues made it difficult for researchers to navigate within the organization and hampered the collaboration with therapists.

Hence, it was challenging to receive (ongoing) support from therapists to include patients in the study. During the pilot study, therapists had almost full control over which patients were asked to participate. Based on previous research, we expected that this would lower referral barriers and increase their efforts to recruit patients. We tried to assist therapists in this process by reminding them about the study and its aim during team meetings and by sending regular reminder emails. Despite these efforts, a number of referral barriers were reported. These were all in line with previous literature: therapists indicated that they sometimes simply forgot to include patients because of high workloads, felt uncomfortable asking patients because they were afraid to burden them cognitively, emotionally, or financially, were confused about the aim of the research and its inclusion criteria, and experienced distrust about the gains of research participation for patients. We therefore planned individual meetings with therapists who experienced most troubles with including patients, and discussed the possibilities for extra support from the researchers. This did not improve inclusion. In line with previous study recommendations, we also tried

to recruit patients without the help of clinical professionals by placing posters with study information in patient waiting rooms. This only led to the inclusion of one participant.

During the follow-up study, the stricter inclusion criteria and tracking patients' treatment progress via electronic patient files, decreased therapists' control over which patients to include in the study. Moreover, this allowed the researchers to provide more (specific) support in helping therapists to remind which patients to invite to participate, and when to do this, which lowered some of the referral barriers. In addition to previous recommendations, we also experienced that in providing effective assistance to therapists, the presence and visibility of the researchers within the ADHD program were of key importance. In collaborating with therapists, it was needed to take an individualized and consistent hands-on approach in motivating them to actively recruit patients. For example, for some therapists it was helpful that we expressed our understanding that active patient recruitment was challenging due to other work-related issues. For others, the regular promotion of the study's progress, aims, or struggles, kept them actively involved. Moreover, showing therapists that we were sensitive in dealing with participant-related challenges during data collection, and had experience in coping with challenging psychiatric and behavioral problems of patients, were important stimulants for participant recruitment.

Finally, some flexibility in the research design was needed to move along with the dynamic nature of clinical practice. At the same time, and in line with previous recommendations, keeping research procedures as similar as possible to existing procedures within the outpatient center, worked best to facilitate smooth collaboration with patients, therapists, and other personnel. This was particularly important for patient recruitment, scheduling research appointments, and collecting data from patient files.

4.4 CONCLUSIONS

Reviewing the literature on 'hard-to-reach' populations in clinical care showed that a comprehensive, multifaceted approach across all stages of research is needed (e.g., Bonevski et al., 2014) to deal with the variety of study challenges related to studying severely impaired psychiatric patients, their social networks, and mental health care more generally. Previous study recommendations to overcome these challenges included practical strategies to lower participant burden to a minimum with regard to the number of research appointments, the efforts needed to attend these, and efforts needed to understand and successfully complete the study materials for patients. Moreover, the importance of taking a participant-centered research approach was emphasized (Bonevski et al., 2014; Ellard-Gray et al., 2015; Moore & Miller, 1999; Waheed et al., 2015), as this enhances motivation in patients and in clinical professionals who are involved in participant recruitment. Specific recommendations included involving formal and informal network members in

the research process to act as patients' gatekeepers, providing a caring study environment, and stressing the study's benefits for patients and treatment in general.

We explored the feasibility of these and other study recommendations from previous research on hard-to-reach samples in a sample of 52 forensic outpatients with ADHD and their social networks. In this case example, we showed that even though our research was designed and adjusted to the study sample and context of interest, many of the expected participant-related challenges remained to exist, thus complicating participant inclusion, (standardized) assessment, and research compliance. Regarding social network and health service related factors, we experienced that it was challenging to get patients' permission to contact (many of their) social network members, and to get into contact with them. In line with previous research, other contextual issues included complying with policy and organizational structures of the health service and receiving ongoing support of involved clinical professionals.

In dealing with these challenges, working closely with therapists as patients' gate keepers, tracking (possible) study participants via multiple tracking methods, keeping research procedures as similar as possible to existing procedures within the health service, and having a flexible research design during the entire study, were effective recommendations from previous literature. In addition, we experienced that being present and visible within the outpatient center, having (clinical) experience with the sample, and actively and sensitively assisting patients during data assessment were required to keep a participant-centered approach in this sample. Furthermore, using an individualized, and consistent hands-on approach was needed to keep therapists actively engaged in the study.

Evidently, participant motivation increases if patients (and clinical professionals) feel that their help is valued, experience that researchers are sensitive to their participation barriers, and make an effort to meet their needs. This is similar to building a therapeutic relationship in treatment, which is an important factor for increasing treatment compliance and outcome (e.g., Leach, 2005). For future studies, it might therefore also be helpful if patients already know the researcher who will conduct data assessment before they are asked to participate. Similarly, involving important network members in the research process (e.g., Waheed et al., 2015) by informing them about the study and its aims via information letters may be helpful. Yet, this is more difficult to apply without obtaining patients' permission to do so first.

Additionally, this review provided insight into recruiting a representative hard-to-reach sample. In our case example, we showed that many patients with ADHD dropped out of treatment before we had the chance to include them. This suggests that these patients were more impaired or less motivated for treatment than the patients that did participate. Similarly, we recommend future studies on hard-to-reach samples to report on the actual size of the patient population of interest, and to provide information on dropout rates and reasons. This can provide important knowledge on the representativeness of the patients that do participate in research.

Inherent to our research design, some of our experiences are difficult to generalize. We only tested the research design in one forensic outpatient center in the Netherlands, which limits the generalizability of our experiences to other forensic services, patients, and countries. Nonetheless, this case study illustrated that even when relevant recommendations of previous studies are incorporated in research designs on new populations, the uniqueness of every population will likely continue to challenge the creativity of researchers. In developing a feasible research design for hard-to-reach samples, the devil seems to be in the details. To identify these details in different populations, researchers need to invest time to familiarize with the study population and actively collaborate with clinical professionals, other network members, and each other. More knowledge is needed on which research strategies work for whom, and what adjustments can be made to improve research designs. Eventually, if we are able to adequately adjust research designs to the weaknesses and strengths (e.g., the enthusiasm and loyalty of patients who are satisfied with treatment) of the research samples of interest, this can help in setting realistic research goals and likely increases motivation and support in all parties involved.

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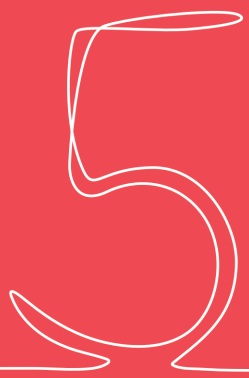
Chapter 5

Disorder-specific symptoms and psychosocial well-being in relation to no-show rates in forensic ADHD patients



ABSTRACT

No-show rates in forensic psychiatry are related to higher recidivism risk and financial costs in mental health care, yet little is known about risk factors for high no-show rates. In this study, the extent to which disorder-specific symptoms and psychosocial well-being are related to no-show rates in forensic patients with ADHD was examined. Sixty male patients with ADHD (*M* age = 5.9, *SD* = 8.6) who received treatment in a Dutch forensic outpatient center completed the Adult Self Report on disorder-specific symptoms and general psychosocial well-being. Data on no-show rates and background characteristics were obtained via electronic patient files. Independent sample *t*-tests showed a trend in which patients with high no-show rates (15–45% missed appointments) had more ADHD symptoms compared to patients with low no-show rates (0–14.9% missed appointments). Furthermore, multivariate regression analyses showed that rule-breaking, externalizing problems and somatic problems were associated with higher no-show rates, whereas anxiety problems were associated with lower no-show rates. Results suggest that no-show rates in forensic patients with ADHD are related to specific psychopathological symptoms. This knowledge can be used to prevent no-show in forensic psychiatric treatment.

5.1 INTRODUCTION

Outpatient services can provide an efficient form of health care, but the high rates of missed outpatient appointments (i.e., no-shows) result in inefficient use of these services, and lead to additional costs and delays in waiting lists (George & Rubin, 2003). Next to economic and financial consequences, high rates of no-shows in mental health care are also related to poorer treatment outcomes of patients (Matas, Staley, & Griffin, 1992). Previous research has shown that newly discharged psychiatric inpatients who do not attend follow-up outpatient appointments, show an up to three times increase in relapse in previous disorders compared to patients who do not miss appointments (Koch & Gillis, 1991). Furthermore, those who do not attend outpatient clinics have lower social functioning and more severe mental health problems than those who do attend at follow-up (Killapsy, Banerjee, King, & Lloyd, 2000).

Previous research on no-show rates and related factors has mostly been conducted at regular mental health facilities and has largely neglected no-show rates in forensic mental health care. In the current study, no-show rates among forensic outpatients will be addressed. Mental health treatment in forensic psychiatric outpatient clinics is often a compulsory part of a criminal sentence. Therefore, low intrinsic treatment motivation (Grunebaum et al., 1996; Matas et al., 1992; Woicik, Van der Lem, Sijtsema, & Bogaerts, 2017) and a negative attitude towards professional help (Paige & Mansell, 2013) may increase risk for higher no-show rates in these patients. For example, previous research showed that nearly a third of forensic patients who received compulsory treatment, withdrew from psychiatric services within one year after the start of treatment (Shaw, Tomenson, Creed, & Perry, 2001). This is problematic because untreated psychopathological problems due to missed appointments can result in higher risk of recidivism (Feitsma, Popping, & Jansen, 2012; Olver, Stockdale, & Wormith, 2011). More knowledge on no-show rates and related risk factors in forensic patients is thus warranted.

Risk for no-shows is particularly likely for forensic patients who have a diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD). ADHD is a psychiatric developmental disorder that is characterized by two major impairments: hyperactivity/impulsivity and attention problems (American Psychological Association, 2013). ADHD is highly prevalent in forensic populations. Estimates of ADHD prevalence rates vary from 10-70% in prisoners (Ghanizadeh, Mohammadi, Akhondzadeh, & Sanaei-Zadeh, 2011; Rösler et al., 2004; Young, Moss, Sedgwick, Fridman, & Hodgkins, 2015), compared to only 1-6% in the general adult population (Kessler et al., 2006). Having ADHD is further associated with elevated levels of criminal behavior in adolescence and adulthood (Pratt, Cullen, Brevins, Daigle, & Unnever, 2002). Hence, levels of ADHD are likely increased in patients in forensic psychiatric care. One explanation for the high rate of criminal behavior in patients with ADHD is the limited impulse control inherent to ADHD, which can lead to

impulsive behaviors, such as reactive aggression and other antisocial behavior (Barkley, 1997; Retz & Rösler, 2009, 2010).

Researchers have stressed that adequate treatment of ADHD in forensic psychiatric institutions is needed to decrease the risk of reoffending (Young & Thome, 2011), but research on treatment compliance in forensic patients with ADHD is scarce. ADHD in forensic psychiatric patients may affect treatment adherence for two reasons. First, patients with ADHD may experience difficulties with compliance to treatment in general, due to core symptoms of ADHD, such as impulsivity, forgetfulness, reduced planning skills, reduced motivation, and disorganization (Cubillo, Halari, Smith, Taylor, & Rubia, 2012; Safren, Duran, Yoval, Perlman, & Spricht, 2007). Relatedly, it has been shown that medication non-compliance in patients with ADHD is problematic, with non-compliance rates ranging from 13.2-64.0% (Adler & Nierenberg, 2010; Safren et al., 2007).

Second, patients with ADHD are at risk for no-show due to the high prevalence of comorbid psychiatric problems, which in turn are associated with treatment attrition (Lincoln et al., 2005). In particular, behavioral and mood disorders (McGough et al., 2005; Merikangas et al., 2010), substance use disorders (Biederman, Wilens, Mick, Faraone, & Spencer, 1998; Faraone et al., 2007; McGough et al., 2005), and cluster B personality disorders (Anckarsäter et al., 2006) are highly prevalent comorbidities in (non-forensic) patients with ADHD. Previous research in general psychiatric care provides evidence for a relationship between these disorders and no-show rates. In these studies, non-compliant patients were more often diagnosed with substance abuse disorders (Livianos-Aldana, Vila-Gómez, Rojo-Moreno, & Luengo-López, 1999; Sparr, Moffitt, & Ward, 1993), posttraumatic stress disorder (Sparr et al., 1993), depression (Daggy et al., 2010), and/or personality disorder (Fenger, Mortensen, Poulsen, & Lau, 2011; Matas et al., 1992). In forensic patients with ADHD, these comorbidity rates are expected to be increased (Einarsson, Sigurdsson, Gudjonsson, Newton, & Bragason, 2009; Westmoreland et al., 2010), suggesting that forensic patients with ADHD are highly heterogenic with regard to disorder-specific symptoms, and may differ widely in treatment adherence. The diversity of ADHD-related symptoms, and comorbid disorders within patients with ADHD make it particularly important to examine to what extent disorder-specific symptoms are associated with differences in no-show rates in these patients.

In a previous study on this topic, no-show rates were studied in a sample of forensic patients with ADHD in a Dutch forensic outpatient center[1]. Patients with ADHD missed about 17% of their appointments (Woicik et al., 2017). These no-show rates were associated with features related to the start of treatment. Specifically, not showing up on the intake appointment and no-shows at the first appointment after the intake procedure was associated with higher no-show rates overall. Disorder-specific symptoms (i.e., symptoms that are indicative of particular mental health disorders), such as internalizing

1 *Note*. In the current study, data were collected at the same forensic outpatient clinic.

problems and substance dependency problems, were not associated with no-show rates in that study, but the researchers did not use systematic research instruments to measure these symptoms. In the current study, the relationship between disorder-specific symptoms and no-show rates is examined in a more systematic way.

In addition to the relation between psychopathology and no-show rates in patients with ADHD, no-show rates may be related to psychosocial problems, and treatment and demographic factors. For example, research on social impairment indicates that patients with ADHD have difficulties in social skills, such as expression and control of verbal and non-verbal communication (Friedman et al., 2003). As a result of impaired social functioning, individuals with ADHD often experience interpersonal difficulties, such as having fewer friendships, more marital difficulties, employment problems, and family dysfunction than individuals without ADHD (Eakin et al., 2004; Young, Chadwick, Heptinstall, Taylor, & Sonuga-Barke, 2005). In addition, higher no-show rates occur when patients have to wait longer for their first appointment (Grunebaum et al., 1996; Livianos-Aldana et al., 1999; Peeters & Bayer, 1999). Demographic characteristics, such as single status (Matas et al., 1992), younger age (Mitchell & Selmes, 2007), being unemployed (Sharp & Hamilton, 2001), and having a lower socioeconomic status (Matas et al., 1992; Neal et al., 2001) have also been related to higher no-show rates. Because these psychosocial, demographic, and treatment factors are likely to be related to treatment adherence, we accounted for these factors in the current study when explaining no-show rates in patients with ADHD.

The high rate of ADHD in forensic patients and the comorbidity of ADHD symptoms with other psychopathological and social problems, highlight the importance of conducting research in this specific setting. More insight into rates of no-shows in forensic patients with ADHD is needed to effectively reduce no-shows. To this end, we examined the relationship between no–show with disorder-specific symptoms and general psychological well-being in a group of 60 forensic patients with ADHD in the Netherlands.

We hypothesized that higher rates of no-shows are associated with more disorder specific-symptoms, including severity of ADHD symptoms, substance use, and (antisocial) personality problems. Furthermore, we hypothesized that higher rates of no-shows are associated with lower psychosocial well-being.

5.2 METHOD

Participants

Participants were recruited from a Dutch forensic psychiatric outpatient clinic located in four cities in the south-west of the Netherlands. The patient population varies in the type of psychiatric disorders (e.g., ADHD, autism, antisocial personality disorder). Patients receive individual or group therapy for psychiatric or personality disorder(s) and related delinquent or aggressive behavior. There are a number of disorder-specific treatment

programs, but these programs all share the main goal of decreasing patients' risk for (re-)offending. Patients are either treated compulsory as part of a criminal sentence, or are treated voluntarily after referral by a general practitioner or other health care professional. Patients start their treatment with an intake procedure. When they fail to show up at two consecutive intake appointments, they are discharged from the forensic outpatient clinic and therefore are not included in the current study. If ADHD symptoms are observed during the intake procedure (and if patients have not yet been diagnosed with ADHD in another mental health institution), patients receive extensive psychological and psychiatric assessment directly after the intake procedure in order to determine whether they qualify for the diagnosis ADHD (i.e., see measures; ADHD). In addition, whether ADHD (and related offense behavior) should be the primary focus of treatment is discussed further. Specifically, based on clinical observation and psychiatric assessment, patients are evaluated on 1) whether or not they have an intellectual disability (i.e., IQ ≤ 70), and 2) if they qualify for another, severe, DSM-diagnosis that should be the primary focus of therapy, including psychotic disorders, severe mood disorders, and severe substance dependency (i.e., to a degree that patients are not able to attend treatment appointments sober). If these conditions are ruled out, patients are recommended for the specialized multimodal treatment program for adults with ADHD and aggressive and antisocial behavior, developed at the clinic. This program adheres to the principles of the risk–need–responsivity model (Andrews, Bonta, & Hoge, 1990). In accordance with the European consensus statement of The European Network Adult ADHD (Kooij et al., 2010), the program starts with providing patients with information about ADHD and its association with aggressive and antisocial behavior. Furthermore, patients are offered psychological treatment for comorbid psychiatric disorders, and substance related problems if applicable, and are offered 'side modules', such as pharmacotherapy, practical support and help with social difficulties, financial, work related- or daily routine-problems.

To be included in the current study, participants had to be between 18 and 65 years old, have a diagnosis of ADHD in combination with aggressive and/or delinquent behavior, and were receiving treatment within the forensic ADHD treatment program between January 2013 and July 2015. Furthermore, because there are only a few female patients who are treated at the clinic, only male patients were included. This resulted in a sample of 60 male adult patients with ADHD with aggressive and/or antisocial behavior (*M* age = 35.9, *SD* = 8.6). Most patients were of Dutch nationality (97.1%), and were either living alone (38.8%), or together with a spouse or partner (10.0%), and their children (23.8%) at time of inclusion. Over one-third of the patients only finished primary school (35.0%), another 30.0% also finished secondary school, and 30% received vocational education. A minority (5.0%) had not finished primary school. Based on their educational levels, most patients were estimated to have a low (36.7%) or average level (55.0%) of intellectual functioning. On average, patients received treatment at the clinic for more than 1 year (i.e., the average length of treatment was 471.8 days; see Table 1 for treatment duration and waiting times

for the whole sample, and for groups of low and high no-show). About 87% of these patients were in treatment voluntarily because of their aggressive or antisocial behavior. Five percent were in treatment voluntarily, but were also awaiting a court session for a committed offense. The remaining patients (8.3%) received mandatory treatment.

Procedure

All patients who received treatment in the forensic treatment program for adults with ADHD between January 2013 and July 2015, were asked to participate in the study. Patients had to sign written informed consent prior to data collection in line with institutional and ethical guidelines. Patients who met the inclusion criteria and agreed to participate, were asked to fill out a questionnaire. Data on no-show rates was based on all treatment appointments that patients had received from the start of their treatment until July 2015. Hence, the timeframes in which no-show rates were examined thus dependent on patients' treatment duration at that time. This data was obtained from the electronic patient files retrospectively.

Measures

No-show rates. No-shows were defined as not showing up to treatment without giving notice or cancelling a treatment appointment within 24 hours, which is a rule that patients are informed about at the start of their treatment. Information on no-show rates were obtained from Electronic Patient Files, including the total percentage of no-shows (i.e., higher scores indicate more missed appointments), no-show on the intake-interview (*no = 0, yes = 1*), and no-show on the first appointment after the intake procedure is completed (*no = 0, yes = 1*). We also stratified the percentage of no-show based on the median, in order to be able to compare groups of low (0-14.9%) and high (15.0-45.0%) no-show on the different outcome variables. This stratification was made to distinguish between patients who 'occasionally' missed an appointment, and those who had more structural levels of no-show.

ADHD. About half of the participants were diagnosed with ADHD at the clinic (n = 34), whereas the other participants received their ADHD diagnosis before intake at another mental health institution (n = 26). In the clinic, psychological assessment for ADHD comprises the administration of the Diagnostic Interview for Adults with ADHD (DIVA) (Kooij & Francken, 2010). The DIVA is a semi-structured interview that is based on DSM-IV criteria (APA, 1994). Both attention deficits, and hyperactivity and impulsivity symptoms are assessed with 9 questions about related symptoms. For all symptoms, patients are asked whether these have been present during their adult lives (that is, in the past 6 months or longer), and whether these were (also) present during childhood (i.e., between 5 and 12 years of age; *0 = No*, *1 = Yes*). In order to reduce recall bias, interviews are conducted in the presence of older family members whenever possible. Total scores were computed for symptoms in adulthood, and for symptoms in childhood by calculating

the sum of all positive answers. ADHD is diagnosed when participants recognize (at least) 6 of the total number of symptoms related to attention deficits, and/or 6 of the total number of hyperactivity/impulsivity symptoms in both adulthood and childhood (DIVA Foundation, 2013).

After administering the DIVA, patients receive a psychiatric consultation to confirm the diagnosis and to make sure a primary psychotic disorder or depressive disorder is absent. Patients who are diagnosed with ADHD in another institution also receive this psychiatric consultation in order to confirm the ADHD diagnosis. For this study, DIVA scores of the patients who were diagnosed with ADHD at the clinic were obtained from their electronic patient files after they agreed to participate in the study.

Disorder-specific symptoms. Disorder-specific symptoms were assessed via four subscales of the Adult Self Report (ASR; Achenbach & Rescorla, 2013). This 126-item self-report questionnaire is suitable for adults between 18 and 59 years and is designed to measure facets of DSM-oriented problem behavior. The instrument consists of three scales, in which disorder-specific symptoms are measured in different ways and levels of specificity, including the DSM-oriented subscales (i.e., depressive problems, anxiety problems, somatic problems, avoidant personality problems, attention deficit/hyperactivity problems, and antisocial personality problems), the more specific syndrome scales (i.e., anxious/depressed, withdrawn, somatic complaints, thought problems, attention problems, aggressive behavior, rule-breaking behavior, and intrusive behavior), and the broad-band problems or summed scales (i.e., internalizing, externalizing, and total problems). Items were scored on a 3-point scale, ranging from *0 = not true* to *2 = always true*. The scores of these subscales were calculated by summing the relevant items. The ASR also provides a separate scale to measure substance use with two items. These items assess how many days participants were inebriated, and/or used drugs in the past 6 months. In previous research, the ASR had high test-retest reliability (r = .79 - .88) and good construct validity (r= .62 - .78) (Achenbach & Rescorla, 2003). In the current study, Cronbach's alpha values of the ASR scales ranged from .67 to .80 for the DSM-oriented scales, from .60 to .91 for the syndrome scales, and from .90 to .94 for the summed scales.

General psychosocial well-being. General psychosocial well-being was assessed via the adaptive functioning scales of the ASR (Achenbach & Rescorla, 2013). The adaptive functioning scales include items concerning friends, spouse or partner, family, job, and education. The friends and family scales were scored for all respondents (e.g., "How many real friends do you have?", and "Indicate how well your relationship with your mother is, compared to others"). Yet, the spouse/partner, job, and education scales were scored only for respondents to whom the items applied at any time in the preceding 6 months (e.g., "If in the past six months, you have lived together with your spouse or partner, indicate how much you agree with the following statement: In the past 6 months, me and my partner were having troubles"). Consequently, because these items applied only to half of the participants, adaptive functioning with regard to the spouse/partner, job and

education scales could not be analyzed. Because we wanted to give at least some indication of the role of employment on rates of no-shows, we therefore computed a dichotomous variable to differentiate between participants who had or had not been working in the past six months before filling out the ASR. The friends and family scales were obtained by computing mean total scores of the items, such that higher scores indicated better general psychosocial well-being.

Background measures. Electronic Patient Files were used to obtain background information, such as age, ethnicity, living situation at time of inclusion in this study, level of education, level of intellectual functioning (e.g., below-average, average, or above-average, estimated by clinical observations), type of treatment (i.e., voluntarily or mandatory), and treatment waiting times. Information about comorbid Axis I and II disorders as classified on the DSM-IV (APA, 1994) were obtained. These disorders were either diagnosed through psychiatric consult and/or personality assessment directly after the intake interview.

Statistical analysis

All analyses were performed using IBM Statistical Package for the Social Sciences (SPSS) Version 20. Two-tailed tests were used with a significance level of 0.05. First, whether or not missing data were missing was examined at random with Little's (1988) Missing Completely at Random (MCAR) test. As this was the case, missing data on the ASR DSM-oriented and syndrome scales were replaced by imputed values via multiple imputation (Rubin, 1987). About 4.5% of the data on these subscales were missing and were imputed via multiple imputation with full conditional specification, which has shown to be a statistically valid method for creating imputations in data sets (Liu & De, 2015). All analyses with these subscales were conducted on the pooled imputed data (*n* samples = 5). The ASR substance use scale could not be imputed because this scale consists of only 2 items asking during how many days in the past 6 months patients used alcohol or drugs. Also, the friends and family adaptive functioning scales were not suitable for multiple imputation because of their specific item formulations (i.e., "How many friends do you have?", and "How well do you get along with your brother?"). These items were therefore not estimated by other ASR items. Instead, missing values on these scales (4.4% of the data on these scales), were replaced by participants' mean total scores on the particular scale. All analyses with these variables were thus conducted on the original sample. Two patients were excluded from all analyses because of too many missing data. The final sample therefore included 58 participants.

Independent sample *t*-tests, chi-square tests, and Fisher's exact tests were conducted to assess differences between patients with low and high levels of no-show on background characteristics (i.e., demographic variables, treatment duration, waiting times, and DSM-diagnoses retrieved from the electronic patient files), no-show at the intake interview and at the first appointment after the intake procedure, DIVA scores, and scores on the ASR scales. Furthermore, in order to assess associations between disorder-specific

symptoms, general psychosocial well-being, and rates of no-shows, we calculated Pearson's correlations in the total sample. We corrected for multiple hypotheses testing using the Holm-Bonferroni method (Gaetano, 2013; Holm, 1979). Finally, three multiple regression analyses were conducted to examine multivariate associations between disorder-specific symptoms as measured by the ASR scales (i.e., DSM-oriented, syndrome- and summed scales) and rates of no-shows. Because half of the participants had no information on the DIVA scores and substance use and adaptive functioning scales of the ASR-scales, we did not conduct regression analyses on rates of no-shows for these variables.

5.3 RESULTS

On average, patients received 92.6 appointments in total and missed 15.0 appointments (*SD* = 14.3, range 0 - 70), which indicates an average rate of 16.2% no-show. Five percent of the total sample did not show up at the intake interview, whereas 20.0% did not show up at their first appointment after the intake procedure (Table 1).

Table 1. Means and standard deviations of treatment duration, waiting times in days, and number of no-shows in beginning of treatment for the total sample, and for groups of low and high no-show

	Total sample (*N* = 60)	Low no-show 0.0-14.9% (*n* = 33)	High no-show 15.0-45.0% (*n* = 27)	
	M (SD)	*M (SD)*	*M (SD)*	*p*
Length of treatment in days	471.8 (447.3)	545.1 (517.0)	382.1 (331.6)	.15
Waiting time intake in days	26.5 (17.4)	27.2 (15.8)	25.7 (19.4)	.75
Time between intake and first appointment after intake procedure in days	32.1 (16.3)	29.0 (12.3)	35.8 (19.7)	.13
No-show				
No-shows intake interview *n* (%)	3 (5.0)	0 (0.0)	3 (5.0)	.09
No-shows first appointment after intake interview *n* (%)	12 (20.0)	4 (6.7)	8 (13.3)	.09

With regard to comorbid disorders as classified on the DSM-IV, 81.9% of the patients with ADHD was diagnosed with one or more comorbid Axis I disorder(s). These typically included substance-related disorders (70.0%), impulse control disorders (21.7%), mood disorders (18.3%), other developmental disorders (10.0%), and anxiety disorders (5.0%). Moreover, 38.3% of the patients had one or more comorbid Axis II disorder(s), of which 18.3% included a cluster B personality disorder and 16.7% a personality disorder not otherwise specified. Due to complex psychiatric problems, for about half of the patients (48.3%), decisions on Axis II diagnoses were made during the course of treatment. Several patients experienced relational problems (13.3%) and/or had experienced physical abuse (11.7%).

Background characteristics for low and high rates of no-shows

In order to compare groups of low and high rates of no-shows on background characteristics, treatment duration and waiting times, and DSM-diagnoses, the percentage of no-show was stratified into groups of low (0-14.9%) and high (15-45%) no-show rates based on a median split. Independent sample *t*-tests, chi-square tests, and Fisher's exact tests showed that groups did not differ on background characteristics, treatment duration and waiting times, or rates of no-shows at the beginning of treatment (i.e., intake interview and first appointment after the intake procedure). Moreover, groups did not differ on type of DSM-diagnoses, but patients with high rates of no-shows more often had a comorbid Axis I disorder (M = 1.9, SD = 0.9) compared to patients with low rates of no-shows (M = 1.3, SD = 1.0, $p < .05$).

Disorder-specific symptoms and psychosocial well-being for low and high rates of no-shows

Table 2 reports scores on disorder-specific symptoms and psychosocial well-being as measured by the DIVA and the ASR scales for the total sample and for groups of low and high rates of no-shows. In line with our first hypothesis that rates of no-shows are associated with more disorder-specific symptoms, results showed that patients with high rates of no-shows had a higher severity of ADHD symptoms at the time they received their diagnosis, based on their DIVA total scores, compared to patients with low rates of no-shows. Also, patients with high rates of no-shows reported more antisocial personality problems compared to patients with low rates of no-shows as measured by the ASR DSM oriented scales. Yet, when we corrected for multiple hypotheses testing using the Holm-Bonferroni method (Gaetano, 2013; Holm, 1979), group differences on DIVA total scores (i.e., adjusted significance level; $p < .006$), and antisocial personality problems (i.e., adjusted significance level; $p < 0.003$) were not significant (i.e., corrections were based on the number of tests conducted on the original data and the imputed data, separately). Also, in contrast to our hypothesis, no-show groups did not differ on the ASR substance use scales. Moreover, there were no differences in psychosocial well-being between the low and high no-show groups.

Correlations and regression analyses on patients' percentage of no-show

Bivariate correlations (not presented in table) showed that the ASR scales antisocial-personality problems (r = .37, $p < .01$), rule-breaking behavior (r = .32, $p < .05$), and somatic problems (r = .27, $p < .05$) were significantly associated with higher rates of no-shows. In contrast to our hypotheses, the percentage of no-shows was not associated with ADHD symptoms, substance use, and psychosocial well-being.

Table 2. Disorder-specific symptoms and psychosocial well-being for the total sample and for groups of low and high no-show

	Total Sample (N = 58)	Low no-show 0.0 - 14.9% (n = 31)	High no-show 15.0 - 40.0% (n = 27)	p
DIVA total	28.7 (4.8)	27.0 (5.3)	30.9 (3.0)	.01
DIVA attention deficits	14.7 (3.4)	13.8 (4.0)	15.9 (2.0)	.07
DIVA hyperactivity/impulsivity	14.1 (3.1)	13.4 (3.6)	15.0 (2.1)	.12
ASR DSM scales [a]				
Depressive problems	10.8 (5.0)	10.2 (4.4)	11.5 (5.7)	.32
Anxiety problems	6.8 (2.8)	6.9 (2.9)	6.8 (2.8)	.85
Somatic problems	4.0 (3.4)	3.3 (3.1)	4.9 (3.5)	.07
Avoidant personality problems	6.1 (2.9)	6.0 (3.1)	6.2 (2.8)	.77
Inattention	7.6 (2.3)	7.6 (2.2)	7.7 (2.5)	.85
Hyperactivity/impulsivity	7.6 (2.6)	7.2 (2.5)	8.0 (2.6)	.25
Antisocial personality problems	12.7 (4.3)	11.2 (5.6)	14.4 (6.1)	.04
ASR Syndrome scales [a]				
Anxiety/depressed	15.1 (6.9)	14.7 (6.8)	15.6 (7.1)	.63
Withdrawn	7.2 (3.4)	6.8 (3.6)	7.8 (3.1)	.18
Somatic complaints	6.7 (4.4)	5.9 (4.3)	7.6 (4.4)	.13
Thought problems	5.0 (3.1)	4.9 (2.8)	5.3 (3.5)	.63
Attention problems	14.4 (5.0)	13.8 (4.8)	15.0 (5.3)	.34
Aggressive behavior	13.9 (5.6)	13.5 (5.8)	14.4 (5.4)	.53
Rule-breaking behavior	9.8 (5.0)	8.7 (4.8)	11.1 (5.1)	.07
Intrusive behavior	3.8 (2.8)	3.2 (2.4)	4.5 (3.0)	.08
ASR Summed scales [a]				
Internalizing problems	29.0 (12.6)	27.2 (12.5)	31.1 (12.7)	.25
Externalizing problems	27.6 (11.3)	25.4 (10.9)	30.0 (11.4)	.12
Total	93.2 (31.2)	88.2 (29.2)	99.0 (33.1)	.19
ASR Substance use scales				
Days of drug use in past 6 months	60.7 (78.6)	47.5 (73.5)	76.9 (83.1)	.16
Days being drunk in past 6 months	6.7 (14.9)	7.3 (16.8)	5.6 (12.6)	.72
ASR adaptive functioning scales				
Friends	1.6 (0.7)	1.7 (0.7)	1.5 (0.8)	.18
Family	1.1 (0.5)	1.1 (0.6)	1.1 (0.5)	.76
Job in past 6 months n (%)	31 (52.5)	17 (53.1)	14 (51.9)	.92

Note. Results are presented as *M (SD)* and are based on the original data, unless otherwise specified
Note. DIVA = Diagnostic Interview for Adults with ADHD, ASR = Adult Self Report
[a] Based on the pooled data of five imputed datasets

Next, these associations were tested using multivariate regression analyses (Table 3). Regression analysis with the ASR DSM-oriented scales showed that antisocial personality problems and somatic problems were associated with higher rates of no-shows, while controlling for age and other DSM-oriented scales. Furthermore, age and anxiety problems were associated with lower rates of no-shows. Analyses with the ASR syndrome scales further showed that rule-breaking behavior was associated with higher rates of no-shows. Finally, there were no significant associations between broad-band internalizing and externalizing problems and rates of no-shows, when accounting for age.

Table 3. Regression analyses of percentage of no-show on Adult Self Report (ASR) scales

		B(SE)	*p*
ASR DSM Scales	R^2 *range*	0.39 - 0.50	0.01 - <0.01
	Constant	35.03 (8.15)	
	Age	-0.46 (0.16)	0.01
	Depressive problems	0.10 (0.45)	0.83
	Anxiety problems	-1.70 (0.68)	0.01
	Somatic Problems	1.38 (0.52)	0.01
	Avoidant personality problems	0.03 (0.60)	0.96
	Inattention	-0.56 (0.71)	0.43
	Hyperactivity/impulsivity	-0.53 (0.69)	0.45
	Antisocial personality problems	0.85 (0.30)	0.01
ASR Syndrome Scales	R^2 *range*	0.28 - 0.44	0.10 - 0.03
	Constant	27.82 (8.55)	
	Age	-0.43 (0.18)	0.02
	Anxiety/depressed	-0.22 (0.40)	0.58
	Withdrawn	0.41 (0.60)	0.49
	Somatic complaints	0.78 (0.45)	0.09
	Thought problems	-0.89 (0.61)	0.15
	Attention problems	-0.38 (0.42)	0.37
	Aggressive behavior	-0.14 (0.43)	0.75
	Rule-breaking behavior	0.98 (0.46)	0.03
	Intrusive behavior	0.35 (0.64)	0.59
ASR Summed Scales	R^2 *range*	0.17 - 0.30	0.01 - 0.02
	Constant	24.55 (7.32)	
	Age	-0.43 (0.17)	0.01
	Internalizing problems	0.20 (0.17)	0.26
	Externalizing problems	0.06 (0.16)	0.70

Note. Results are based on the pooled data of five imputed datasets (N = 58)

5.4 DISCUSSION

The aim of the present study was to examine psychopathological and psychosocial correlates of no-show rates in forensic patients with ADHD. In the current study, participants missed on average 16.2% of their appointments and this no-show rate was related to several psychopathological factors. Specifically, rule-breaking, antisocial personality, and somatic problems were associated with higher no-show rates, whereas anxiety problems were associated with lower no-show rates. These findings suggest that rates of no-shows during forensic psychiatric treatment are related to antisocial behavior in daily life, which consist of having difficulties with complying with rules in general. As such, antisocial individuals may have more problems with showing up for treatment compared to others. Moreover, we found that somatic problems, such as having experienced symptoms of palpitations, nausea, and vomiting in the past six months were positively associated with no-show rates. Evidently, physically not being able to travel from one place to another results in higher no-show rates.

The finding that anxiety problems were associated with lower rates of no-shows, corresponds to earlier studies on anxiety problems and punishment sensitivity. These studies, suggested that anxious patients may be more worried about the consequences when missing an appointment (Potts, George, Martin, & Barratt, 2006). It may be that antisocial adults experience lower levels of anxiety compared to non-antisocial adults and care less about the negative consequences when not showing up.

In addition, by comparing patients with high and low levels of no-shows we showed that those with high no-show levels had more ADHD symptoms. However, these findings should be treated with caution due to the relatively small number of patients with DIVA scores, which limited the statistical power of the analyses. Also, when controlling for multiple testing, this finding was not significant. This trend in which severity of ADHD symptoms were associated with higher rates of no-shows, corresponds to research showing that ADHD is positively associated to medication non-compliance (Adler & Nierenberg, 2010; Safren et al., 2007). It is tempting to speculate that the core symptoms of ADHD (e.g., attentional problems, impulsivity, forgetfulness and disorganization) affect the ability to achieve long term goals, such as compliance in therapy. This idea is also supported by research suggesting that patients with ADHD are less future-oriented and are more delay-aversive than healthy controls (Scholtens, Rydell, & Yang-Wallentin, 2013; Sonuga-Barke, 2002). However, more research is needed to confirm our finding and to examine which ADHD symptoms or underlying symptom deficits are in particular related to higher no-show rates.

Of note, we found that patients with ADHD and high no-show rates more often have comorbid axis I disorders (see also Fenger et al., 2011; Matas et al., 1992; Sobanski, 2006) compared to patients with low no-show rates. We had no prior hypothesis about this relationship, and have not examined it systematically. Therefore, this finding should

be interpreted with caution. Yet, in an earlier study, comorbidity was also associated with drop-out (Lincoln et al., 2005). A tentative explanation for these findings is that patients with multiple diagnoses, who are thus more severely impaired, might not be ready to participate in outpatient treatment and consequently do not show up at appointments. Receiving treatment in an outpatient clinic may be difficult because it requires patients to be able to execute a number of complex tasks, such as being able to organize and plan ahead the journey to the outpatient clinic. Such tasks may be more challenging for patients with ADHD and additional psychopathological problems. However, it should also be noted that an unregistered number of patients with severe psychiatric disorders (i.e., those with a psychotic or depressive disorder as primary disorder on Axis I) were excluded from the current study. This likely has affected the relationship between comorbid axis I disorders and rates of no-shows.

Our hypothesis that higher rates of no-shows were negatively associated with psychosocial well-being was not supported by the data. This contrasts with earlier research showing that social support of family members can be a protective factor against no-show (Feitsma et al., 2012). However, because we only assessed the quality of the relationship that patients have with different family members and friends, we may have missed important additional features of these social ties, such as the nature of the relationship and characteristics of the network members. An in-depth analysis of patients' network members may shed more light on the role of social support on treatment compliance.

Also in contrast to our hypothesis, no relation was found on substance use and rates of no-shows. This is surprising, given that substance abuse is one of the most stable factors associated with treatment non-adherence (e.g., O'Brien, Fahmy, & Singh, 2009). However, there are some methodological explanations for our findings. The items measuring substance use (e.g., "Indicate on how many days you were drunk in the past six months?"), may have been too difficult to answer for patients and may therefore have been subject to social desirable responding. Furthermore, scores on the DSM axis I scales showed that substance abuse was more than 30% in both no-show groups. Substance use may thus not be a discriminating factor with respect to no-show rates.

The findings of this study should be interpreted with some limitations in mind. First, there were several methodological limitations. The small sample size has limited the statistical power of the study, and a significant number of missing data on some variables may have resulted in less reliable outcomes in our statistical analyses. However, we were able to partly address this issue by using multiple imputation which resulted in more reliable results. Additionally, the almost exclusive use of self-reports may have biased the results. In general, the Adult Self Report addresses issues that may be difficult to answer for some patients, in particular because many patients suffer from serious psychiatric problems (Soderstrom, Sjodin, Carlstedt, & Forsman, 2004). More specifically, previous research showed that patients with antisocial, histrionic, narcissistic, and sadistic personality disorders, which are highly prevalent in forensic settings, do not always fill

out self-report measures reliably (De Ruiter & Greeven, 2000). Participants may have thus under- (or over-) reported problems, which affects the reliability of the data. Finally, no systematic research instruments were used to diagnose comorbid Axis I and II disorders, which warrants caution for interpreting our findings and data.

Second, because the data on no-show rates were retrospective in nature, it was not possible to link the reported disorder-specific symptoms and psychosocial factors to particular moments of no-shows in time, but only to the number of missed appointments over a specific treatment period. Because of this design, we were also not able to control for the type of treatment that patients received. Specifically, we had no information on medication use, because we were not able to examine in the electronic patient files at which point during treatment patients started medication use, and how well they complied with the prescribed medication treatment. Thus, some of our results maybe confounded by differences in medication use between patient with low and high rates of no-shows.

In future studies it may be particularly important to use prospective study designs, which allow for following patients from the start of their treatment and provide insight into the timing of no-shows. This design would also allow to collect data on medication use in a more controllable manner, which could be an important discriminating factor in explaining rates of no-shows. Moreover, the current findings should be replicated and extended in a larger sample of forensic psychiatric patients with ADHD, thereby taking into account whether treatment was received mandatory or voluntarily.

In conclusion, we showed that antisocial personality problems, anxiety problems, and somatic problems are associated with no-show rates in patients with ADHD. Patients who display antisocial personality problems and who have fewer anxiety problems may thus also be at higher risk of reoffending. Furthermore, in line with earlier findings on treatment adherence in general psychiatry, we found a trend suggesting that symptom severity of ADHD was associated with higher rates of no-shows. The current study highlights the importance of accounting for psychopathological factors to explain and potentially reduce no-show rates in forensic patients with ADHD. Efforts to reduce triggers for no-show in patients with externalizing problems, and ADHD may for example include staying in touch with patients and reminding them about appointments (Downer, Meara, Da Costa, & Sethuraman, 2006; Lefforge, Donohue, & Strada, 2007), have a neat clinic organization, clearly scheduled appointments, consistent staff adherence (Gariti, Greenstein, Olsen, & Harris, 1987), and reduced waiting times (Folkins, Hersch, & Dalen, 1980; Matas et al., 1992; Woicik et al., 2017). Insight into patients' psychopathological problems may thus generate more awareness in therapists about who is at risk for no-shows.

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Chapter 6

Cognitive-motivational, interpersonal, and behavioral functioning in relationship to treatment and research compliance in forensic patients with ADHD

ABSTRACT

This study was designed to provide more insight into treatment and research responsivity in offenders with ADHD. Specifically, it was examined whether poorer cognitive-motivational, interpersonal, and behavioral functioning were related to treatment no-shows, longer treatment time duration intervals, and no-show at the research appointment in 52 forensic outpatients with ADHD (*M* age = 35.3, *SD* = 9.38). To this end, patients participated in cognitive computer tasks and filled out self-reports. Treatment compliance was tracked for 10 appointments after research participation. Regression analyses showed that higher self-reported impulsivity was associated with research no-show, and more alcohol use with longer treatment time intervals. Yet, self-reported delay aversion was associated with *fewer* treatment no-show, and, uncontrolled for alcohol use, impulsivity was associated with *shorter* treatment time intervals in a subsample of patients. These results suggest that externalizing behaviors increase risk for non-compliance in forensic ADHD patients, but that cognitive-motivational problems also motivate patients to be more compliant.

6.1 INTRODUCTION

Attention-Deficit Hyperactivity Disorder (ADHD) is a developmental disorder (American Psychiatric Association, 2013) that persists fully or partially into adulthood in the majority of patients (Faraone, Biederman, & Mick, 2006). Adults with ADHD often have psychosocial impairments in multiple life domains (Goodman, 2007). Core ADHD symptoms and associated cognitive-motivational deficits, including response inhibition difficulties and a need for direct stimulation, predispose patients to poor decision-making (Mowinckel, Pedersen, Eilertsen, & Biele, 2014) and risk behaviors (Flory, Molina, Pelham, Gnagy, & Smith, 2006). In particular, patients with ADHD are at increased risk for offending (e.g., Young, Moss, Sedgewick, Fridman, & Hodgkins, 2015). ADHD symptoms are associated with an earlier age of onset, and increased (re)offending rates in forensic populations (Philipp-Wiegmann et al., 2018; Young, Wells, & Gudjonsson, 2011). Furthermore, patients with ADHD are at an increased risk because of comorbid externalizing disorders (e.g., antisocial personality disorder, substance use disorders, Retz & Rösler, 2010), and associated risk factors, such as attachment problems (Houtepen, Sijtsema, Van der Lem, Van Hooydonk, & Bogaerts, 2019). Moreover, these risk factors are likely closely interlinked, and interact throughout patients' lives. This makes offending in adults with ADHD a multifaceted problem for which adequate treatment is needed.

Yet, many adults with ADHD do not receive sufficient treatment (Kooij et al., 2010). ADHD in adulthood remains poorly recognized and underdiagnosed in clinical practice (Katzman, Bilkey, Chokka, Fallu, & Klasse, 2017). Next to pharmacological treatments, there are only a few evidence-based treatment programs for adults with ADHD (e.g., Solanto et al., 2010; Safren et al., 2010), and in particular, psychological treatments that target ADHD and offending behavior are lacking. Only one forensic treatment program has been developed for patients with ADHD (Young & Cocallis, 2019). Yet, to date, its effectiveness has only been tested in non-forensic samples (Emilsson et al., 2011; Young et al., 2017).

In addition, recent research on forensic patients with ADHD suggests that when patients do receive treatment for offending, core ADHD symptoms and comorbid externalizing problems challenge patients' treatment compliance (Stoel, Houtepen, Van der Lem, Bogaerts, & Sijtsema, 2018). Although more research is warranted, these results suggest that the risk factors for which offenders with ADHD need help, are also the ones that may obstruct their way to recovery. Moreover, risk factors that are known to complicate treatment in difficult patient samples, often also complicate the conduct of research on these samples (Paige & Mansell, 2013), their treatment, and issues with responsivity. As such, risk factors for treatment compliance in forensic patients with ADHD remain largely understudied.

In the current study, we study this responsivity issue in treatment and research in offenders with ADHD, by examining associations between patients' cognitive-

motivational, interpersonal, and behavioral functioning in relationship to treatment adherence and related issues. Previous research on these patients (Stoel et al., 2018; Woicik, Sijtsema, Van der Lem, & Bogaerts, 2017), focused mainly on patients' general and comorbid psychopathological symptoms (i.e., behavioral functioning; *see below*). Additionally, treatment characteristics were examined using retrospective research designs, which complicated the interpretation of findings. Using a prospective design to measure treatment compliance, we aim to replicate and extend previous results and examine symptom underlying, and associated difficulties related to ADHD and offending.

Cognitive-motivational functioning

Weakness in response inhibition (Barkley, 1997) and motivational 'deficits' characterized by a heightened sensitivity for immediate rewards (Sonuga-Barke, 2003) are among the most important deficits associated with patient variabiliy in ADHD symptoms (Ma, Van Duijvenvoorde, & Scheres, 2016; Sonuga-Barke, Sergeant, Nigg, & Willcutt, 2008). Impulsive behavior resulting from response inhibition deficits is thought to result from difficulties in suppressing or interrupting (inappropriate) dominant behavioral responses in individuals with ADHD (Barkley, 1997). Deficits in response inhibition further affect poor cognitive, verbal, and emotional impulse control and result in difficulties with delaying gratification (Barkley, 2010). In contrast, motivational deficits primarily drive impulsive behavior on a cognitive and emotional level. Patients with ADHD behave impulsively because they discount the value of future rewards (i.e., temporal reward discounting; Jackson & Mackillop, 2016), or feel distressed when they have to wait for future rewards and therefore, are motivated to avoid delays (i.e., delay aversion; Sonuga-Barke, 2003). There is some support that poor cognitive-motivational functioning is a risk factor for offending in adults with ADHD: Both types of impulsivity have been associated with offending behaviors in adults with ADHD (e.g., McDonagh, Travers, & Bramham, 2018; Thorell, Sjöwall, Mies, & Scheres, 2017). Also, a number of studies comparing adult offenders with ADHD and non-offending adults with ADHD, showed that offenders with ADHD had more inhibition problems (Bramham & Giollabhui, 2016; Ginsberg, Hirvikoski, & Lindefors, 2010; Meier, Perrig, & Koenig, 2012). These studies suggest that poor cognitive-motivational functioning is a problem in forensic patients with ADHD.

Regarding responsivity to treatment, it can be hypothesized that cognitive-motivational deficits associated with ADHD and offending also challenge treatment adherence in forensic patients with ADHD. In particular, because these deficits are expected to impact patients' abilities to commit to longer-term goals, such as completing psychological treatment in order to achieve better functioning in the long-term. Yet, to date, this has not been examined in patients with ADHD. Most studies focusing on the role of cognitive-motivational deficits in treatment have been conducted in patients with substance use disorders (e.g., Stevens et al., 2014), and only a few studies have been conducted in forensic populations (Fishbein et al., 2009; Peters, Petry, LaPaglia, Reynolds, & Carroll,

2013; Smeijers, Bulten, Buitelaar, & Verkes, 2017). Results of these studies are mixed. In some studies, response inhibition deficits were increased in patients who dropped-out of treatment, and negatively related to progress as indicated by clinical professionals (Fishbein et al., 2009; Vergara-Moragues et al., 2017). Yet, in other studies no associations with treatment drop-out were found (Smeijers et al., 2017; Stevens et al., 2014). Also, (fewer) motivational deficits influenced patients' substance abstinence during treatment in some substance abusing samples (Stevens et al., 2014), but this has not been supported in forensic patients (Peters et al., 2013).

Still, the increasing support for associations between cognitive-motivational functioning and offending and treatment compliance in general, indicates that research on these links in forensic patients with ADHD is warranted. In particular, given the heterogeneity in cognitive-motivational impairments in patients with ADHD (Ma et al., 2016; Sonuga-Barke et al., 2008), examining combined effects of response inhibition and motivational deficits can be important to explain variability in treatment and research responsivity.

Interpersonal functioning

Next to personal characteristics, interpersonal issues, such as early family characteristics, are important in explaining differential outcomes in functioning in patients with ADHD (Hechtman, 1991; Sonuga-Barke, Auerbach, Campbell, Daley, & Thompson, 2005). Research in adults with ADHD reported interpersonal issues such as having fewer friendships, more marital difficulties, and family dysfunction compared to individuals without ADHD (Eakin et al., 2004; Young, Toone, & Tyson, 2003). These interpersonal difficulties can disrupt the forming of secure attachment relationships in individuals with ADHD and subsequently may have an impact on adaptive functioning throughout the lifespan (Bowlby, 1973). Indeed, higher levels of insecure attachment have been reported in both children and adults with ADHD (Storebø, Rasmussen, & Simonsen, 2016).

In research on adult attachment and its outcomes, generally four styles of attachment are examined (Bartholomew & Horowitz, 1991). These styles are based on a dichotomized view of other people as being supportive, and the self as being worthy of this support, as described by Bowlby (1973). Hence, *securely* attached individuals are believed to have positive images of themselves and other people, whereas *preoccupied* individuals only have positive images of others, and negative images of the self. In contrast, *fearful-avoidant* individuals have negative images of both self and other people, and *dismissive-avoidant* attached individuals only have negative views of others. Recently, these insecure attachment styles were found to be elevated in a subsample of the current study, compared to healthy controls and associated with self-reported externalizing behaviors as well (Houtepen et al., 2019). Similarly, insecure attachment styles (i.e., avoidant styles, in particular) have been considered important risk factors for offending in other clinical and offender samples too (Ogilvie, Newman, Todd, & Peck, 2014).

Regarding treatment responsivity, both insecure attachment and issues within patients' social environment have been found to impact upon the way in which patients are able to profit from psychological treatment (e.g., Feitsma, Popping, & Jansen, 2012; Levy, Ellison, Scott, & Bernecker, 2011). Research on attachment styles shows that individuals with insecure attachment are more likely to miss treatment appointments in primary care (Ciechanowski et al., 2006), and have more difficulty with forming a healthy therapeutic alliance because of distrust in others (Berry & Danguah, 2016). In turn, the quality of the therapeutic alliance has been strongly associated with treatment outcomes (Martin, Garske, & Davis, 2000; Kozar & Day, 2012). Furthermore, there is some indication that social support from family members is a protective factor against no-show in forensic treatment (Feitsma et al., 2012; Sung, Belenko, Feng, & Tabacknick, 2004). Hence, it may be argued that because patients with ADHD often have lifelong social difficulties, they may have few prosocial individuals within their social networks (Garcia et al., 2019), who stimulate treatment compliance. As such, both insecure attachment styles and poor social support may be risk factors for poor treatment compliance in forensic patients with ADHD.

Behavioral functioning

Finally, next to several traditional background characteristics (e.g., O'Brien, Fahmy, & Singh, 2009), one of the most reported risk factors for treatment non-compliance is the presence of externalizing behavioral problems. Despite some minor differences, studies consistently reported that patients with antisocial personality disorder, violent behavior (Cullen, Soria, Clarke, Dean, & Fahy, 2011), substance abuse (Fenger, Mortensen, Poulsen, Lau, 2011; Matas, Staley, & Griffin, 1992), and psychopathy (Cullen et al., 2011) are at increased risk for treatment no-show and drop-out. Similarly, in earlier research on treatment no-show in forensic outpatients with ADHD (Stoel et al., 2018), increased levels of antisocial behavior were associated with higher no-show rates. Hence, because comorbidity rates with externalizing problems are high in (forensic) patients with ADHD (Ginsberg et al., 2010; Retz & Rösler, 2010), we also examined comorbid externalizing problems as a risk factor for poor treatment and research compliance in the current study.

The current study

In sum, treatment compliance may be challenging for offenders with ADHD (Stoel et al., 2018; Woicik et al., 2017), which can result in high no-show and drop-out rates during treatment. No-shows and dropout in treatment results in high economic costs, and a waste of professional time (Moore, Wilson-Witherspoon, & Probst, 2001). Moreover, poor treatment compliance may result in poorer treatment outcomes. In forensic psychiatry, where treatment goals not only focus on enhancing patients' mental health but also on reducing the risk for reoffending, poor compliance may thus also be associated with higher recidivism rates in non-compliant patients (O'Brien & Daffern, 2016). More knowledge

on risk factors associated with treatment compliance in forensic patients with ADHD is thus important.

We examined patients' treatment compliance during forensic outpatient treatment, by examining associations between cognitive-motivational, interpersonal, and (externalizing) behavioral functioning in relationship to no-show and the time duration in days it took patients to finish a fixed number of treatment appointments (in the following: 'treatment time intervals'). In addition, we examined no-shows on research appointments. We hypothesized that poorer cognitive-motivational (response inhibition and motivational deficits), interpersonal (insecure attachment and poor social support), and behavioral functioning (i.e., more externalizing behavior), were positively associated with no-shows and longer treatment time intervals in forensic outpatients with ADHD. Finally, we examined whether these associations explained treatment and research non-compliance above and beyond demographic and background risk factors.

6.2 METHOD

Participants

Fifty-two Dutch forensic outpatients with ADHD (*M* age = 35.3, *SD* = 9.38, range 19 – 61) participated in the study. Patients were recruited from a forensic outpatient center in The Netherlands in which a multimodal treatment program for ADHD and offending has been initiated. In this program, adults with ADHD receive treatment for their psychiatric disorder(s) and related offending behavior in different phases with the main goal of reducing risk for (re)offending. Patients receive compulsory treatment as part of a juridical measure, or are in treatment voluntarily after referral by a general practitioner or other mental health professional. Treatment phases include diagnostics, followed by psychoeducation for ADHD and its relationship with externalizing behavior, cognitive-behavioral therapy for aggressive or other delinquent behavior, and schema-focused therapy targeting personality problems, if indicated. Additionally, patients receive 'side modules' including pharmacotherapy, practical support for social-, financial-, work related-, or daily routine-problems, and treatment for substance abuse if applicable. The program is certified by the Foundation for Top Clinical Mental Health Care, and in line with both the Risk–Need–Responsivity model (Andrews, Bonta, & Hoge, 1990) and the European consensus statement on the treatment of Adult ADHD (Kooij et al., 2010).

In this study, most patients with ADHD (84.6%) had comorbid psychiatric disorder(s). Of these, substance use disorders (n = 27) and other impulse control disorders (n = 16) were most common. Also, three patients had a comorbid autism spectrum disorder, and two patients had a mild intellectual disability. Furthermore, 10 patients (19.2%) were diagnosed with cluster B personality disorder and 12 others (23.7%) with cluster B personality traits. Only 14 patients (26.9%) were currently receiving court-ordered treatment, others were

in treatment voluntarily. Of the 38 patients receiving treatment voluntarily, 22 (57.9%) did have a judicial past.

Of note, due to difficulties with including patients in the study and subsequent power issues, the current study also made use of data from 11 patients included in a pilot study (see Procedure). Group comparisons of the two patient groups using independent sample *t*-tests and Mann-Whitney *U* tests showed no differences on any of the study variables of interest. Hence, in general, there was variation in the type of treatment that patients received when they were included. Fourteen patients had (almost) finished the diagnostic phase, 23 patients were receiving psychoeducation, five patients received aggression-regulation therapy, and two patients received schema-focused therapy. Moreover, four patients were receiving long-term maintenance therapy to keep treatment progress stabilized, and four patients were on a waiting list for receiving treatment within the ADHD program, or only received treatment side modules at the time. Half of the participants received psychotropic medication for ADHD and/or comorbid disorders.

Procedure

This study was conducted in accordance with the American Psychological Association's ethical guidelines and approved by the Ethical Review Board at the first author's university (EC-2015.38). Prior to data collection, we conducted a power analysis using G*Power3 (Faul, Erdfelder, Lang, & Buchner, 2007) to determine the minimum number of participants needed to test multivariate associations of large effect sizes ($f^2 = .35$) with alpha = .05, in a regression model with 6 predictors. Results showed that a total sample of 46 participants was required to achieve a power of .80.

Between 1 October 2016 and 31 December 2018, patient inflow in the ADHD treatment program was tracked via electronic patient files and weekly team meetings for practitioners, in which all new patients are discussed. Inclusion criteria were male gender, being 18 years or older, and having an ADHD diagnosis. When these criteria were met, and there were no major objections for participation (such as being in crisis), therapists were asked to invite patients to participate after they (had almost) finished the diagnostic phase, or had just started treatment in the ADHD program. Patients who were interested received an information letter about the study's aim and procedure, and were contacted by telephone to plan a research appointment at the outpatient center. Patients were informed that participation was voluntarily and that they could withdraw from the study at any time, without providing a reason for this. Participation included one appointment of approximately 2 hours, including a short break.

During the research appointment, patients first signed written informed consent. Thereafter, patients participated in three computer tasks (i.e., a Go/No-Go task, a temporal discounting task, and the Balloon Analogue Risk Taking task (BART; Lejuez et al., 2002; which was not used in the current study)) and filled out a number of self-report questionnaires together with one of the researchers. After the research appointment,

patients' treatment compliance was followed for the first 10 treatment appointments that were planned at the outpatient center, via the electronic patient files. Patients received a gift voucher for their participation of either 5, 10 or 15 euros based on their performance on the BART. For a detailed explanation of this task, please see Lejuez et al. (2002). In contrast to the task described in Lejuez et al. (2002), in the task used in the current study, participants earned a number of points instead of a number of cents for every balloon that did not explode (i.e., the number of points equaled the number of clicks that they used to inflate the balloon). Based on the maximum amount of points that could be earned on the task, we divided all scores into a 'low', 'medium', and 'high' scoring category and payed participants accordingly. Travelling expenses were reimbursed with an additional gift voucher.

The actual research appointments took place from October 2016 until April 2019. Of the 133 patients who entered the ADHD treatment program between 1 October 2016 and 31 December 2018, we included 41 patients (30.8%). The other patients most often dropped out of treatment to early, were referred to another mental health facility, or had agreed to participate, but then dropped out of the study before the research appointment had taken place. Because the number of participants we included in the original study was too small to examine multivariate associations in some of the regression models, we also made use of data collected from 11 patients during a pilot study. The pilot study was conducted in the period from January 2016 until April 2016. In contrast to the original study, in the pilot study, we also included patients who already were receiving treatment within the forensic ADHD treatment program for a longer period of time (i.e., *M* treatment duration in days = 507.09, *SD* = 674.16; range = 49 – 2339). Other procedural differences included a few differences in the self-report questionnaires used (see Measures), and the fact that during the pilot study patients filled-out the standardized questionnaires by themselves (but in the presence of one of the researchers).

Measures

Cognitive-motivational functioning. *Response inhibition* was measured with a Go/No-Go computer task in which patients had to respond to frequent Go stimuli (the letter O; 120 trials), and inhibit responding to infrequent No-Go stimuli (the letter X; 40 trials). The number of errors made on the No-Go trials (i.e., errors of commission), are considered to reflect inhibitory control, with more errors indicating poorer control. The task we used was similar with regard to inter-trial duration (i.e., 1600 *ms*), stimulus simplicity, and presentation (i.e., 200 *ms*) to a task used in research on adults with antisocial personality disorder (Dolan & Park, 2002) and children with ADHD (Rubia et al., 2001). Patients were instructed to press the response button as fast as they could when Go-stimuli appeared on the computer screen, to inhibit responding to No-Go stimuli, and to make as few mistakes as possible. Before the actual task started, patients participated in a practice block to ensure that they correctly understood the instructions. Next to the number of stopping mistakes

on No-go trials, we calculated patients' average reaction times (RT) on Go-responses in milliseconds. Faster reaction times indicated quicker, and thus more impulsive responding (Bezdjian, Baker, Lozano, & Raine, 2009; Halperin, Wolf, Greenblatt, & Young, 1991).

Self-reported impulsivity was assessed with 4 adjusted items (α = .79) of the International Personality Item Pool – Neuroticism-Extraversion-Openness inventory (IPIP-NEO; Witt, Donnellan, & Blonigen, 2009). The IPIP-NEO is originally developed to assess personality traits in the general population. Items are scored on a four-point scale (*1 = completely disagree* to *4 = completely agree*), with higher scores indicating higher levels of (re)acting without thinking, thus poorer inhibition: i.e., "I make rash decisions", "I jump into things without thinking", "I rush into things", and "I act without thinking". Higher mean total scores indicated more impulsivity.

Motivational functioning was assessed with a hypothetical temporal discounting task (Scheres, Lee, & Sumiya, 2008). In this task, participants were asked to make choices between receiving smaller immediate monetary rewards and larger rewards that can be obtained later in time, based on their preferences. The amount of the delayed reward was the same in every trial (i.e., €100). The amount of the immediate rewards and the delay durations varied between trials (i.e., range €10 - €100, and: 1 month, 1 year, and 5 years). This way we were able to calculate patients' temporal discounting functions. Temporal discounting refers to the fact that the subjective value (SV) of a reward decreases as the distance to the reward into the future increases. The rate at which this SV goes down as a function of waiting time varies across individuals. In experimental paradigms, temporal discounting is measured by presenting individuals with choices between a smaller immediate reward and a larger delayed reward. Typically, the immediate reward, while always smaller than the delayed reward, varies in magnitude. The delayed reward is constant in magnitude but the delay preceding its delivery varies. By analyzing the choice pattern of individuals (i.e., we calculated the proportion of delayed reward choices for each delay duration per person, multiplied this by the range of plausible SV's, and added the lowest possible SV (see Mies, Ma, De Water, Buitelaar, & Scheres, 2018)), every participant gets an estimation of the SV of the delayed reward, for each delay duration. The change in SV as a function of delay duration can be plotted as a persons' discounting function (Critchfield & Kollins, 2001). The more rapidly the SV of a large reward decreases as a function of time, the steeper the discounting function and the higher the preference for immediate rewards. Based on the SV's for each delay, the "area under the curve" (AUC) of this discounting function was calculated (see for a detailed explanation: Myerson, Green, & Warusawitharana, 2001), and used as dependent variable. Smaller AUC's reflected steeper discounting and thus strong preference for smaller immediate rewards. Results of a recent meta-analysis supported the discriminant validity of monetary temporal reward discounting tasks by showing consistent steeper temporal reward discounting in patients with ADHD compared to healthy controls (Jackson & Mackillop, 2016).

Self-reported motivational deficits were assessed with the Quick Delay Questionnaire (QDQ; Clare, Helps, & Sonuga-Barke, 2010). This questionnaire has been developed to quickly assess altered delay behavior in adults, with 5 items measuring delay aversion (α = .82) and 5 items measuring delay discounting (α = .67). Participants indicated how much (*1 = not like me at all* to *5 = very like me*) they agreed with items, such as "Having to wait for things makes me feel stressed and tense", and "The future is not important to me, I only consider the immediate consequences of my actions". Higher mean total scores indicated more delay aversion and delay discounting. Previous research in adults with ADHD showed that the QDQ has sufficient internal reliability (Thorell et al., 2017). Results of that study further showed scores on the QDQ were associated with measures indicative of patients' functional impairment, but not with laboratory measures of executive functioning and discounting. This suggests that both type of measures should be used to adequately assess cognitive-motivational functioning in patients with ADHD.

Interpersonal functioning. *Attachment styles* were measured with the Attachment Styles Questionnaire (ASQ; Van Oudenhoven, Hofstra, & Bakker, 2003). This questionnaire assesses adult attachment from a general perspective, rather than attachment within particular relationships. Items include general statements about relationships with others, such as: "I find it relatively easy to get close to others", and "I do not really feel safe in forming close relationships, because I fear I will get hurt". Participants indicated on a five-point scale (*1 = strongly disagree* to *5 = strongly agree*) to what extent they agreed with the statements. Higher mean total scores on the attachment scales indicated higher levels of that particular attachment style. Initially four attachment style scales were computed: secure (8 items; α = .65), preoccupied (7 items; α = .84), fearful (5 items; α = .78), and dismissive attachment (4 items; α = .46). Yet, because the reliability of the dismissive attachment scale was insufficient in this study, we decided to calculate a combined avoidant attachment style to use in the analyses, by combining participants' mean scores on the dismissive and fearful attachment scale. The internal reliability of the combined fearful/dismissive-avoidant style was sufficient with α = .70. Psychometric properties of the ASQ have previously only been tested in general populations, were the scales had sufficient reliability and construct validity (Van Oudenhoven et al., 2003).

Social support was assessed by asking participants to list (a maximum of 10) network members who played an important role in their lives at that moment. Next, participants were asked the following 4 questions (α = .88): "To whom of these persons you would *like* to turn to for support, in case you had a problem?", "To whom of these persons you would *actually* turn to for support in case you had a problem?", "On whom of these persons, you *wish* you could always count on, no matter what?", and "On whom of these persons you can *actually* always count on, no matter what?". Social support scores were computed by summing the number of listed network members for each of the questions, and dividing this number through the total number of network members that the participant listed as playing an important role in his life at that moment. Higher scores thus indicated higher

levels of (proportional) perceived social support as provided by the most important network members of each participant.

Behavioral functioning. Externalizing behaviors were assessed with four self-report questionnaires. A short form of the Aggression Scale (Bryant & Smith, 2001) was administered to assess self-reported anger (3 items; α = .69), hostility (3 items; α = .78), and (verbal and physical) aggression (6 items; α = .63). The Aggression Scale includes items such as "I have difficulty keeping my composure" and "Sometimes, I cannot suppress the tendency to hit someone". Items are rated on a five-point scale (*1 = completely disagree* to *5 = completely agree)* with higher mean total scores indicating higher levels of externalizing behavior. The psychometric properties of the aggression scales were sufficient in previous research in (forensic) clinical samples (Hornsveld, Muris, Kraaimaat, & Meesters, 2009).

Also, antisociality was assessed with 16 items (α = .70) of the Impulsive Antisociality scale creation of the IPIP – NEO inventory (Witt et al., 2009). Items assessing antisociality include statements such as "I take advantage of other people", and "I obstruct other people's plans", which were rated on a four-point scale (*1 = completely disagree* to *4 = completely agree*). Higher mean total scores reflected higher levels of self-reported antisociality. During the pilot study, we administered a short-form of the antisociality scale, including only 4 items (α = .80), which was used to compute mean total scores on antisociality in the 11 patients of the pilot.

Alcohol use was measured with 4 items (α = .77) of the Alcohol Use Disorders Identification Test (AUDIT-4; Gual, Segura, Contel, Heather, & Colom, 2002; Saunders, Aasland, Babor, De la Fuente, & Grant, 1993), and drug use was assessed with 4 similar items from the Drug Use Disorders Identification Test (DUDIT; Berman, Bergman, Palmstierna, & Schlyter, 2003). The AUDIT was developed to identify risky or harmful alcohol use, and asks about people's alcohol use within the past year. In previous research, the shorter 4 item AUDIT-4 detected risky drinking in clinical populations as well as the 10-item AUDIT does (Gual et al., 2002). Items include: "When you drink alcoholic beverages, how often do you drink more than 6 glasses of alcohol?" and "Has a family member, friend, physician, or other professional ever worried about your alcohol consumption or given you advice to drink less?". Participants answered questions on a five-point scale, with higher scores indicating more severe alcohol use. The DUDIT is developed as a parallel test of the AUDIT and includes exactly the same questions but then targeted at participants' drug use. The psychometric properties of the DUDIT were satisfactory for use in clinical populations in previous research (Hildebrand, 2015).

Of note, the AUDIT and the DUDIT were not administered during the pilot study. All analyses including substance use were conducted on a smaller subsample of n = 41 (see also Statistical analyses). In the result section we therefore refer to 'externalizing behaviors' (including anger, hostility, aggression and antisociality) and 'substance use' (alcohol and drug use), as separate constructs. Yet, severe substance use is of course also externalizing behavior.

Treatment and research compliance. No-show on treatment appointments was tracked via electronic patient files for the first 10 appointments that were planned at the outpatient center after patients had completed data collection during the research appointment. In addition, no-shows on research appointments were tracked by the researchers. No-show was defined by not showing up for treatment or research, without having a reason for this that was beyond patients' control (i.e., such as having a sick child, having a death in the family, or getting into a traffic accident on their way to treatment). No-show rates were calculated by dividing the number of no-shows by the total number of planned appointments.

We also calculated the duration in days between the first and last of the (maximum of) 10 treatment appointments, and used this as an additional indicator of patients' treatment compliance. At the outpatient center where data collection took place, patients have generally some control over how regularly they are seen for treatment. When patients fail to show up for an appointment, some patients reschedule a new appointment as soon as possible (and therefore are considered more motivated or compliant), whereas others try to postpone rescheduling for as long as possible (and thus are considered less compliant). In addition, if applicable, treatment side modules are often provided on request. Therefore, compliant (or motivated) patients would be able to receive more (types of) treatment simultaneously, and thus generally would receive more (different types of treatment) appointments within a shorter amount of time. As such, longer treatment time intervals were reflective of poorer treatment compliance here.

Background characteristics. Demographic information and medication use was assessed with self-reports. Background treatment characteristics were retrieved from electronic patient files. Finally, patients' self-reported on treatment motivation by answering the following questions on a five-point scale (*1 = not at all* to *5 = completely agree*): "Are you a person that is generally on time for his treatment appointment?", "Do you consider yourself motivated for treatment at the outpatient center", and "Do you consider the opportunity present, that you will drop-out of treatment before all of your treatment goals are achieved". The last question was reversely scored, so that higher scores indicated higher treatment motivation. During the pilot study, only the question on being on time for treatment appointments was administered.

Statistical analyses

Descriptive analyses were conducted to examine score distributions and missing values. Because score distributions on self-reported treatment motivation showed little variation between patients (i.e., almost no patients indicated not being motivated at all), scores on these variables were dichotomized into *1 = completely motivated* (i.e., always on time, extremely motivated, and not going to dropout of treatment before all treatment goals are achieved), and *0 = little to moderately motivated for treatment*. No-show during the research appointments was also transformed into a dichotomized variable (*1 = having*

missed a research appointment, 0 = not having missed a research appointment), because only three patients had missed the research appointment more than once. Eleven patients from the pilot study had missing data on 2 of the 3 self-report questions on treatment motivation, and substance use. Because these variables could not reliably be replaced using information of the other measures administered in the study, we excluded these patients from all analyses including these variables. Five patients had missing data on one of the alcohol use questions. We tested whether these items were missing at random with Little's (1988) Missing Completely At Random (MCAR) test, and replaced the missing values by participant's mean score on the other 3 items measuring alcohol use (Hawthorne & Elliot, 2005). Finally, one patient from the original study dropped out of the study before finishing any of the standardized self-report questionnaires, except for substance use. He was thus excluded from all analyses including variables assessed by the other questionnaires.

Second, we assessed whether any of the background characteristics (i.e., age, educational level, occupational status, having a judicial past, having received treatment in the past, currently receiving medication, receiving treatment as part of a judicial sentence, and self-reported treatment motivation) were associated with no-shows and treatment time intervals, using correlations, independent sample *t*-tests, Mann-Whitney *U* test, and chi-square tests. Also, bivariate associations between all study variables were examined. Given the non-normal distribution on most of the independent variables and all dependent variables, we calculated correlations with these variables using Spearman's rho. Independent sample *t*-tests and Mann-Whitney *U* tests were performed to examine whether patients with and without no-show on research differed on any of the independent variables. Effect sizes were calculated for significant results (i.e., using Cohen's *d* for the *t*-tests, and the Probability of Superiority (SP = *U*/n1 x n2) for the Mann-Whitney *U* tests). We corrected for multiple hypotheses testing using the Holm-Bonferroni method (Gaetano, 2013; Holm, 1979).

Third, multiple regression analyses were performed to assess associations of cognitive-motivational, interpersonal, and behavioral functioning with treatment no-show and treatment time intervals, while controlling for the time that patients were in treatment before the study, and the number of treatment appointments that they had planned after the study. For eight patients we were unable to follow them for 10 appointments after research participation. Four dropped out of treatment too early, and four others completed treatment successfully before this time. Logistic regression analyses were conducted to examine associations with no-show on research. Because of the limited sample size and power issues, we tested associations for the different domains of functioning in separate analyses. Moreover, because most study variables had a non-normal distribution, we performed bootstrapping (Russel & Dean, 2000). Multivariate outliers were checked by calculating Mahalanobis distance, Cook's, Leverage scores, and standardized residuals (Fidell & Tabachnick, 2003), and removed if they significantly impacted the results.

Finally, we conducted parsimonious regression analyses on no-shows and treatment time intervals, including the background variables and the variables assessing cognitive, interpersonal and/or behavioral functioning that were significantly associated with the outcome variables in previous analyses. This way, we tested the robustness of our findings and examined which of the risk factors best explained variation in no-show and treatment time intervals. Because of the missing data on substance use in patients from the pilot study, results of these final analyses are discussed separately for the total sample (N = 52, including patients from the pilot), and the subsample of patients (n = 41) without missing data. A post hoc power analysis (Faul, Erdfelder, Lang, & Buchner, 2007) showed that we had enough power (0.82) when testing multivariate associations of large effect sizes (f^2 = .35) with alpha = .05, in the regression models with 4 predictors and n = 41.

6.3 RESULTS

Descriptive analyses and correlations

In Table 1, patients' background characteristics and descriptive information on all study variables are presented. Regarding associations with demographic and treatment background characteristics, findings showed that only age was significantly negatively correlated with no-show on treatment (ρ = -0.28, p < .05), such that older patients had fewer no-shows. Regarding treatment time intervals, Mann-Whitney U tests indicated that patients who had received previous treatment within the general mental health system, completed the (maximum of) 10 treatment appointments within a shorter number of days (Md = 63.00, n = 35) compared to those who had no treatment history or only had received treatment within forensic care before (Md = 97.00, n = 17, U = 192.5, z = -2.05, p < .05, PS = 0.32). There were no significant differences in background characteristics between patients who had missed a research appointment and those who did not.

Table 1. Background and descriptive information on patients' cognitive-motivational, interpersonal, and behavioral functioning, and treatment and research compliance (N = 52)

Background characteristics		*M* (*SD*)	Range
Age		35.31 (9.38)	19 – 61
Educational level *n* (%)	Low	33 (63.5)	
	Moderate	19 (36.5)	
	High	0 (0.0)	
Employed/full-time study* *n* (%)		24 (46.2)	
Judicial past* *n* (%)		33 (63.5)	
Forensic treatment history* *n* (%)		16 (30.8)	
History of regular mental health treatment* *n* (%)		35 (67.3)	
Self-reported treatment motivation			
Always on time *n* (%)		27 (51.9)	
Fully motivated for treatment** *n* (%)		26 (63.4)	
No opportunity for early drop-out** *n* (%)		22 (53.7)	
Cognitive-motivational functioning			
Stopping mistakes Go/No-Go task		11.1 (6.97)	0.00 – 26.00
Reaction time go responses *ms* Go/No-Go task		248.53 (44.43)	172.56 – 363.91
Area Under the Curve in Temporal reward discounting task		0.31 (0.24)	0.05 – 0.94
Self-reported impulsivity		2.90 (0.67)	1.50 – 4.00
Self-reported Temporal discounting		2.51 (0.75)	1.00 – 4.40
Self-reported Delay aversion		3.99 (0.85)	2.20 – 5.00
Interpersonal functioning			
Secure attachment		3.37 (0.69)	1.71 – 4.71
Preoccupied attachment		2.93 (0.99)	1.14 – 4.71
Fearful/dismissive avoidant attachment		3.69 (0.61)	2.00 – 4.90
Social support		0.53 (0.29)	0.00 – 1.00
Behavioral functioning			
Anger		3.51 (1.07)	1.33 – 5.00
Hostility		3.27 (1.19)	1.00 – 5.00
Aggression		3.20 (0.77)	1.50 – 4.83
Antisociality		2.05 (0.47)	1.00 – 3.50
Substance use**			
Alcohol use		0.93 (0.85)	0.00 – 3.50
Drug use		1.35 (1.06)	0.00 – 3.25

Table 1. Continued

Treatment characteristics	*M* (*SD*)	*Median*	Range
Mandatory treatment* *n* (%)	14 (26.9)		
Treatment duration at time of inclusion in days	268.71 (361.85)	148.50	49.00 – 2339.00
First (maximum) 10 appointments after research participation			
Number of treatment appointments	9.06 (2.32)		2.00 – 10.00
Drop-out/treatment completed* *n* (%)	8 (15.4)		
No-show percentage	0.24 (0.20)	0.20	0.00 – 0.70
Time duration intervals in days	80.17 (49.43)	72.00	7.00 – 242.00
Research engagement			
Number of appointments	1.5 (0.67)		1.00 – 3.00
No-show* *n* (%)	17 (32.7)		

* *Note*. Included dummy variables with Yes serving as the reference category

** *Note*. Eleven patients had missing data on these variables

In Table 2, bivariate correlations between all independent variables and no-show on treatment and treatment time intervals are presented, together with the descriptive statistics for patients who had missed a research appointment and those who did not. Patients' average RT on Go-responses on the Go/No-Go task was positively associated with antisociality, indicating that patients with higher levels of antisociality responded slower (i.e., less impulsive) on the Go/No-Go task. Furthermore, self-reported impulsivity was positively associated with avoidant attachment and externalizing behavior. Self-reported temporal discounting and delay aversion were also negatively associated with secure attachment. Regarding interpersonal functioning, avoidant attachment was negatively associated with social support, and in general, positively associated with externalizing behaviors and drug use (i.e., $n = 41$). Externalizing behaviors were positively associated with drug use ($n = 41$).

Regarding associations with treatment no-show and treatment time intervals, delay aversion was negatively associated with no-show on treatment, and self-reported impulsivity was negatively associated with treatment time intervals. In contrast, alcohol use was positively associated with treatment time intervals ($n = 41$). Moreover, when controlled for multiple testing, group comparisons for no-show on the research appointment showed that patients who had missed a research appointment reported more impulsivity than those who did not ($t(48) = -2.55$, $p < .05$; Cohen's $d = .76$). Patients with no-show on the research appointment also had higher no-show rates on treatment ($U = 429.5$, $z = 2.61$, $p < .05$, $PS = 0.72$). There were no significant associations between interpersonal functioning and externalizing behaviors in relationship to no-shows and treatment time intervals.

Table 2. Bivariate correlations and descriptive statistics on cognitive-motivational, interpersonal, and behavioral functioning and no-shows and treatment time intervals (*N* = 52)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1. No-Go mistakes	-																	
2. Go RT	**-.30***	-																
3. TD AUC	-.05	**.29***	-															
4. Impulsivity self-r	-.10	-.05	-.16	-														
5. TD self-r	.15	.14	-.03	**.34***	-													
6. Delay aversion	.13	.05	-.12	**.31***	**.58****	-												
7. Secure attach	-.00	-.15	.03	-.15	**-.44***	**-.45***	-											
8. Preoccupied	.13	-.04	.01	.16	.04	-.01	.20	-										
9. Avoidant	.00	.23	-.11	**.33***	**.47***	**.54****	**-.53****	-.03	-									
10. Social support	-.09	-.28	.17	-.10	-.02	.01	.20	.07	**-.29***	-								
11. Anger	.23	.03	-.05	**.32***	**.32***	**.44***	-.08	-.09	**.39***	**-.29***	-							
12. Hostility	.04	.13	.16	.21	**.42***	**.33***	-.11	**.37***	.23	.05	**.32***	-						
13. Aggression	.14	.22	.16	.22	.25	**.40***	-.22	.04	**.33***	.01	**.57****	**.28***	-					
14. Antisociality	-.06	**.31***	.09	.21	**.28***	.27	**-.43***	.00	**.30***	-.28*	.25	**.28***	**.57****	-				
15. Alcohol use	-.16	.22	-.30	-.19	-.03	-.00	.09	-.08	-.02	-.29	-.06	.14	.11	.14	-			
16. Drug use	.08	-.07	-.11	.30	.17	**.41***	-.09	.17	**.32***	-.16	.10	**.42***	.27	**.35***	.23	-		
17. Treatm no-show	-.10	-.01	.01	-.08	.12	**-.31***	.22	-.02	-.16	-.05	-.27	-.12	-.20	-.25	.25	-.22	-	
18. TreatmTime	-.01	.16	.09	**-.34***	-.12	-.11	.12	.13	.06	-.13	.15	.17	-.17	.13	**.38***	.14	0.03	-

Table 2. Continued

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
Research no-show																			
No n = 34	*Md* /	12.00	249.23	0.25	**2.74**	2.49	4.20	3.40	2.92	3.66	0.58	3.83	3.33	3.16	2.04	0.75	1.63	**0.10**	70.00
	M (SD)		(48.40)		**(0.66)**	(0.76)		(0.76)		(0.61)				(0.82)	(0.49)				
Yes n = 17	*Md* /	8.00	247.11	0.31	**3.22**	2.54	4.00	3.31	3.29	3.77	0.37	3.67	3.67	3.26	2.08	0.50	1.25	**0.33**	76.00
	M (SD)		(36.19)		**(0.58)**	(0.75)		(0.52)		(0.63)				(0.70)	(0.44)				
	U / *t*	*U* = ns	*t* = ns	*U* = ns	***t* = -2.55***	*U* = ns	*U* = ns	*t* = ns	*U* = ns	*t* = ns	*U* = ns	*U* = ns	*U* = ns	*t* = ns	*t* = ns	*U* = ns	*U* = ns	***U* = 429.50***	*U* = ns

No-Go mistakes = number of commission errors on the Go/No-Go task, GO-RT = reaction time in *ms* on go responses on the Go/No-Go task, TD AUC = area under the curve of the temporal discounting task, self-r = self-reported, attach = attachment, treatm no-show = no-show rate on treatment appointments, TreatmTime = time duration in days between the first and last of maximum 10 treatment appointments

Note. *Md* = median, *M* = mean, *SD* = standard deviation, *U* = Mann-Whitney U test statistic, t = independent sample t-test statistic, ns = not statistically significant at $p < .05$

Note. Eleven patients had missing data on alcohol and drug use

* $p < .05$; ** $p < .001$

Multivariate regression analyses on no-shows and treatment time intervals

Similar to results of the univariate analyses, results of the multivariate regression analyses showed that only cognitive-motivational functioning and substance use were significantly associated with no-shows and treatment time intervals. As such, we only reported the results of the regression analyses including these domains of functioning in Table 3. Regarding cognitive-motivational functioning, delay aversion was significantly negatively associated with no-show on treatment while controlling for the time that patients had been in treatment. Patients who reported higher levels of delay aversion, thus had fewer no-shows on treatment. In addition, self-reported impulsivity was negatively associated with treatment time intervals, and positively with no-show on research, such that patients with higher levels of impulsivity completed the (maximum) 10 treatment appointments in a shorter amount of time, but were more likely to have missed a research appointment. Regarding substance use (n = 41), alcohol use was positively associated with no-show on treatment, and longer treatment time intervals, whereas drug use was negatively associated with no-show on treatment.

For cognitive-motivational functioning assessed with the computer tasks, results showed a significant association with no-show on research after multivariate outliers of two patients (i.e., based on their increased (>2.5) standardized residuals) were removed from the data. In contrast to what we expected, stopping-mistakes on the No/No-Go task were negatively associated with no-show on research, indicating that patients with more mistakes (i.e., and thus more response inhibition deficits) were less likely to have missed a research appointment. Additionally, there was a negative association between RT on Go-responses and no-show on research, when controlling for stopping mistakes and the time that patients had already been in treatment before participating. In contrast to the previous finding and thus in line with the expectations, this indicated that patients with longer reaction times, and therefore less impulsive responding on the Go/No-Go task, were less likely to have missed a research appointment.

Parsimonious regression analyses on the total sample

Finally, we conducted multiple regression analyses on no-shows and treatment time intervals including the background, cognitive-motivational, and substance use variables that were significantly associated with these outcomes in previous analyses. In the total patient sample, we tested associations on treatment no-show with delay aversion, while controlling for age. Results showed that only higher levels of self-reported delay aversion were associated with fewer no-show on treatment (b = -0.06, SE = 0.03, CI 95% [-0.12; -0.01], Model R^2 = 0.14, p < .05). For treatment time intervals, we tested associations with having received treatment within the general mental health system in the past, and self-reported impulsivity, while controlling for the number of treatment appointments that patients had planned during this time. Both having received treatment within the general mental health system (b = -26.18, SE = 12.36, CI 95% [-51.52; -3.32], and having higher

levels of self-reported impulsivity (b = -28.28, SE = 8.76, CI 95% [-44.05; -9.03], were associated with shorter treatment time intervals in days (Model R^2 = 0.43, p < .001). For no-show on research, associations between self-reported impulsivity were examined together with patients' stopping mistakes on the Go/No-Go task, and RT on go-responses. Results showed that in this model, only self-reported impulsivity was significantly positively related to no-show on research (b = 1.29, SE = 0.68, CI 95% [0.28; 2.97], OR = 3.62, OR CI 95% [1.18; 11.11], Nagelkerke R^2 = 0.23, Model $\chi 2$ (3) = 9.02, p > .05). Patients with higher levels of self-reported impulsivity, were more likely to have missed a research appointment.

Parsimonious regression analyses on the subsample (n = 41): Taking substance use into account

Finally, substance use was added to the models examining treatment no-show and treatment time intervals in the smaller subsample, excluding patients from the pilot study. For treatment no-show, results showed that when age, delay aversion, alcohol, and drug use were examined together, none of these variables were significantly associated with no-show on treatment. For treatment time intervals, only alcohol use was positively related to treatment time intervals (b = 22.22, SE = 6.75, CI 95% [7.88; 35.97], Model R^2 = 0.52, p < .001), suggesting that patients with more alcohol use took more time to complete the 10 treatment appointments.

Table 3. Linear and logistic regression analyses of no-shows and treatment time intervals on cognitive-motivational functioning and substance use

	No-show treatment		Treatment time intervals (max) 10 appointments		No-show research			
	B(SE)	95% CI	*B(SE)*	95% CI	*B(SE)*	95% CI	OR	95% CI OR
Cognitive-motivational functioning (N = 52)								
Computer tasks								
R^2	0.11		0.28*		Nagelkerke R^2 = 0.37, Model χ2 = 15.07*			
Constant	0.67 (0.23)		-62.33 (45.39)		5.32 (61.48)		205.09	
Treatment duration Incl	0.00 (0.00)	0.00; 0.00	0.03 (0.03)	-0.01; 0.11	0.00 (0.01)	0.00; 0.01	1.00	1.00; 1.01
Treatment appointments	-0.02 (0.02)	-0.06; 0.01	9.01 (1.38)*	6.24; 11.74	-	-	-	-
No-Go mistakes	-0.00 (0.01)	-0.01; 0.01	0.52 (0.82)	-0.93; 2.40	-0.23 (2.43)*	-0.74; -0.12	0.79	0.67; 0.94
Go RT	-0.00 (0.00)	-0.00; 0.00	0.19 (0.17)	-0.10; 0.57	-0.02 (0.25)*	-0.08; -0.00	0.98	0.96; 1.00
TD AUC	0.13 (0.14)	-0.14; 0.40	3.50 (32.53)	-73.09; 56.84	1.98 (54.64)	-1.52; 6.99	7.38	0.32; 170.74
Self-reported								
R^2	0.21		0.39**		Nagelkerke R^2 = 0.36, Model χ2 = 15.48*			
Constant	0.78 (0.21)		65.52 (41.17)		-5.26 (3.72)		0.01	
Treatment duration Incl	0.00 (0.00)	0.00; 0.00	0.01 (0.02)	-0.03; 0.07	0.00 (0.00)	0.00; 0.01	1.00	1.00; 1.01
Treatment appointments	-0.03 (0.01)	-0.06; 0.00	8.62 (1.91)*	4.90; 12.52	-	-	-	-
Impulsivity	0.01 (0.03)	-0.06; 0.08	-31.65 (13.03)*	-56.54; -6.99	2.44 (1.32)*	1.19; 6.66	11.48	2.19, 60.27
Temporal discounting	0.05 (0.05)	-0.04; 0.14	3.11 (10.41)	-17.39; 23.66	-0.14 (0.79)	-1.86; 1.55	0.87	0.27; 2.79
Delay aversion	-0.12 (0.04)*	-0.20; -0.06	5.08 (8.37)	-11.00; 21.81	-0.84 (0.80)	-3.10; 0.17	0.43	0.13; 1.41

Table 3. Continued

	No-show treatment		Treatment time intervals (max) 10 appointments		No-show research			
	B(SE)	95% CI	*B(SE)*	95% CI	*B(SE)*	95% CI	OR	95% CI OR
Substance use (n = 41)								
R^2	0.19		0.49**		Nagelkerke R^2 = 0.11, Model $\chi 2$ = 3.43			
Constant	0.40 (0.15)		-34.56 (13.70)		-0.95 (1.02)			
Treatment duration Incl	0.00 (0.00)	0.00; 0.00	0.04 (0.04)	-0.01; 0.16	0.00 (0.01)	-0.00; 0.02	1.00	1.00; 1.01
Treatment appointments	-0.02 (0.02)	-0.05; 0.01	9.28 (1.47)*	6.83; 12.59	-	-	-	-
Alcohol use	0.07 (0.04)	0.00; 0.16	27.68 (8.08)*	13.25; 43.90	0.02 (0.60)	-1.23; 1.11	1.02	0.42; 2.44
Drug use	-0.06 (0.03)	-0.13; -0.00	-4.30 (5.66)	-15.65; 6.49	-0.22 (0.41)	-1.03; 0.59	0.80	0.40; 1.59

Treatment duration Incl = treatment duration in days at time of inclusion, treatment appointments = the number of treatment appointments patients had planned within the (max) 10 appointments that no-shows were tracked, No-Go mistakes = number of commission errors on the Go/No-Go task, GO-RT = reaction time in *ms* on go responses on the Go/No-Go task, TD AUC = area under the curve of the temporal discounting task

Note. On the basis of multivariate outliers, two patients were removed from the regression analysis of no-show on research on the computer tasks

* $p < .05$; ** $p < .001$

6.4 DISCUSSION

In the current study, we showed that higher self-reported impulsivity was associated with no-show on research, and that more alcohol use was related to longer treatment time intervals in forensic patients with ADHD. In contrast, higher self-reported delay aversion was associated with fewer no-show in treatment. Moreover, when alcohol use was not taken into account, self-reported impulsivity was associated with shorter treatment time intervals in a subsample of patients. Finally, neither interpersonal functioning (i.e., attachment and social support), nor any of the cognitive-motivational functioning variables when assessed by cognitive computer tasks (and while controlling for self-reports), were related to treatment or research compliance. These findings underline previous research pointing to externalizing behavior as a risk factor for treatment non-compliance in forensic patients with ADHD, but indicate that associations with cognitive-motivational functioning are more complex.

In particular, our findings suggested that while the severity of patients' self-reported impulsivity can be a risk for research no-show, self-reported impulsivity and delay aversion can be protective factors against treatment no-show and longer treatment time intervals in forensic patients with ADHD. Moreover, uncontrolled for self-reported impulsivity, response inhibition deficits seemed *less* severe in patients who had missed a research appointment. This seems to contrast studies that found cognitive-motivational problems (in particular, response inhibition deficits measured with cognitive computer tasks) were related to poorer treatment completion in substance abusing and forensic patients (Fishbein et al., 2009; Vergara-Moragues et al., 2017). The mixed results may be explained by the different treatment outcomes across studies. Delay aversion and self-reported impulsivity may reflect patients' urgency for direct stimulation and immediate action. Therefore, these cognitive-motivational deficits can stimulate the planning of regular treatment appointments and actually showing up, although both can still be differently associated with treatment progress. In particular because next to obvious goals of symptom relief and personal growth (Glimmerveen, Brazil, Bulten, & Maes, 2018), attending therapy provides numerous immediate rewards that may stimulate patients to show-up, such as getting support in coping with daily problems, and having the feeling of actively working on one's problems. Of course, being present does not imply that problems are dealt with effectively.

Alternatively, it can be argued that more severe cognitive-motivational problems in patients cause more suffering, illness awareness, and distress, which motivates patients to show up regularly (and/or enhances therapists' efforts to keep them engaged). This is particularly likely for delay aversion, as this includes patients' levels of distress and anxiousness when having to wait for things, which might also include waiting for problem diminishment, or a next treatment appointment. In previous research, illness severity (Buckalew & Buchalew, 1995), and more (acute) distress (Centorrino et al., 2001; Grunebaum et al., 1996) were also motivators for treatment compliance in other patient

samples. Moreover, anxiety problems have also been associated with fewer no-shows in a previous study on forensic patients with ADHD (Stoel et al., 2018). Together, these results suggest that more worrying and distress stimulate showing up for treatment in forensic patients with ADHD.

In explaining the contrasting findings on patients' self-reported and computer task based cognitive-motivational functioning, a few arguments are worth mentioning. First, computer tasks are conducted under highly structured circumstances, and thus may also reflect an individuals' functioning in the specific research setting and task at hand (e.g., Toplak, West, & Stanovich, 2013). In this sense, self-reports may be closer to daily life experiences and thus have higher ecological validity. Furthermore, it is relatively hard to disentangle the exact meaning behind patients' scores on the computer tasks in general. For example, the fact that the two outcome variables of the Go/No-Go task we used to assess impulsivity (i.e., commission errors and RT on Go-responses) led to opposite outcomes with no-show on research, indicates at least that one of these outcomes is assessing something else. Hence, for slower RT's on Go-responses, it can be speculated that instead of being an indicator of less behavioral impulsivity, slower responding actually reflects patients' conscious efforts to do well on the task. Instead of concluding that less impulsive patients are less likely to miss a research appointment, we should then conclude that patients with higher motivation to do well are more likely to show up during the research. Alternatively, slower RT's could indicate more attentional problems in patients with ADHD, and can result from increased RT variability in patients more generally. The latter seems to be a marker of, or a risk factor for general psychopathology (e.g., Kofler et al., 2013). Overall, these contrasting results further support previous work (Thorell et al., 2017; Toplak et al., 2014) indicating that self-reported cognitive functioning and functioning on cognitive tasks assess different things in patients with ADHD.

Our findings on behavioral functioning are partly in line with previous research on substance abuse in other psychiatric patients (Fenger et al., 2011; Matas et al., 1992). In the current study, alcohol use was associated with longer time intervals between a fixed number of treatment appointments, and higher no-show rates in treatment in a subsample of patients. This indicates that substance abuse is important for treatment responsivity, and in line with formal recommendations (e.g., Harris & Edlund, 2005), should receive primary attention in the beginning of treatment.

In contrast to previous research (Cullen et al., 2011; Stoel et al., 2018), next to substance use none of the other externalizing behaviors were associated with treatment and research compliance. Furthermore, patients' attachment styles and perceived social support were unrelated to treatment and research outcomes. These null findings may be due to methodological issues, such as small sample size, specificity of the sample and the study context, and some of the measurements used (see below). Moreover, patients may have perceived social support by their therapists, and therefore external (and possibly less supportive) social networks are less influential with regard to treatment planning and

showing up (Skeem, Eno Louden, Manchak, Vidal, & Haddad, 2009). Unfortunately, explaining why certain of the expected findings were *not* supported by the current data is particularly difficult, and replication in a larger and more diverse (forensic) psychiatric outpatient samples is warranted before more can be concluded about the role of these factors in the treatment of forensic patients with ADHD.

Regarding demographic and treatment background factors, only a history of regular mental health care was associated with treatment compliance. One reason for this is that there was little variation in demographic factors in our study: most patients were relatively young, low educated, unemployed, had criminal history, and took some form of medication. The fact that only previous treatment within general mental health care resulted in shorter treatment time intervals in patients, may have reflected intrinsic motivation for behavioral change because of previous engagement in voluntary treatment. Previous treatment experiences may also have lowered current barriers for requesting support (Fenger et al., 2011) , or can be indicative of prior learning of other effective treatment coping skills. Alternatively, patients who already had a history of treatment may have had more severe problems for which they currently received more treatments within the outpatient center. This could also have resulted in completing the 10 appointments in a shorter time.

This study had some methodological limitations. First, the small sample size, limited statistical power, and missing data on substance use, the long version of the antisociality scale and some of the self-reported treatment motivation variables in patients from the pilot study, may have influenced the findings. Similarly, other differences in assessment procedures between the pilot and the original study may have affected the internal validity and subsequently the results of the current study. In particular, the specificity and demographic homogeneity of the sample, and the variability in treatment they received, may have complicated finding important differentiating factors for treatment and research responsivity for adult offenders with ADHD. In future studies, it should therefore be aimed to further control for variability in treatment time and treatment phase between patients. Nevertheless, the current sample is a reliable representation of patients with ADHD receiving treatment within the forensic outpatient center in which the study was conducted. Second, we only included patients from one treatment program for ADHD in one forensic outpatient center in The Netherlands, which limited the generalization of our findings. For example, because of the specialized nature of this treatment program, therapists may have been particularly skilled to adjust interventions according to difficult externalizing behaviors or insecure attachment behavior, and therefore these factors were unrelated to treatment compliance. Fourth, self-report data is subject to social desirable responding (Van de Mortel, 2008), which is particularly likely for sensitive or difficult questions filled-out together with the researchers. Furthermore, because none of the self-reported motivation questions regarding treatment was related to any of the treatment compliance measures, this indicates that no-show and treatment time intervals only reflect

a small part of patients' treatment engagement, and that other factors, that were not assessed, obstruct patients in behaving according to their (relatively) high motivations for behavioral change during treatment.

It can also be argued that the measure for self-reported impulsivity was more reflective of patients' general impulsive behavior (rather than response inhibition, per se), and can be considered as an additional indicator of externalizing behavior. Also, therapist factors may have been related to variation in no-show and treatment time intervals. Finally, we measured no-show on research retrospectively. No-shows on earlier treatment appointments may thus have influenced patients' engagement and their responses to the questionnaires.

6.5 CONCLUSION

In sum, the current study was the first to assess treatment compliance prospectively in forensic outpatients with ADHD, and as such, provided additional support that externalizing behavior in these patients, and alcohol use in particular, is associated with non-compliance. In addition, we showed that impulsivity can be a risk factor for no-show on research. In contrast, because higher levels of impulsivity and delay aversion were associated with better treatment compliance, we suggested that more distress, and/or patients' need for direct stimulation can motivate forensic patients with ADHD to regularly show up. Importantly, the complexity of the various interlinked risk factors for poor functioning in the current sample may have affected the role of some of the examined risk factors. Replication in a larger, more diverse forensic psychiatric sample is warranted to test the robustness of these findings and their practical relevance. In particular, studies that allow to examine the effects of clusters of risk factors for treatment compliance in forensic patients seem important to further assist clinical practice in identifying individuals at risk for poor treatment responsivity.

Chapter 7

Discussion and conclusion

7.1 DISCUSSION AND CONCLUSION

From the perspective of the Risk-Need-Responsivity model (RNR; Andrews, Bonta, & Hoge, 1990), forensic patients with ADHD are often at high risk for reoffending and therefore need proportional treatment to diminish this risk. In general, patients suffering from ADHD are also at increased risk for aggression and delinquent behavior because they often have several risk factors that are associated with offending, including impulsivity, cognitive-motivational problems characterized by an increased need for direct stimulation, externalizing problems, such as substance abuse and antisocial behavior, and interpersonal problems within their social networks (e.g., Bramham & Giollabhui, 2016; Thorell, Sjöwall, Mies, & Scheres, 2017; Young, Toone, & Tyson, 2003). Research examining how these factors relate to the increased risk in forensic patients with ADHD is scarce, and in particular knowledge on the role of interpersonal risk and protective factors is warranted. Moreover, little is known about how these personal and interpersonal risk factors are related to patients' responsivity to treatment and research compliance.

In this dissertation, we studied risk and protective factors for offending in forensic patients with ADHD, and the role of interpersonal factors in enhancing and diminishing problem behaviors in individuals with poor self-control, more generally. Moreover, we investigated personal and interpersonal factors associated with treatment and research compliance in forensic patients suffering from ADHD. More knowledge on this group of patients is highly warranted to enhance professional understanding of which factors deserve attention in therapy, and to provide patients with the right support to diminish problem behaviors and enhance well-being in various domains of life. In this final chapter, we summarize and discuss the main findings of the studies we conducted. We provide an integrated summary in which we first discuss our findings on risk and protective factors for offending in individuals with ADHD, and then discuss our findings on risk factors associated with treatment and research compliance in forensic patients with ADHD. Finally, we reflect on our studies' strengths and weaknesses as a whole, and provide recommendations for clinical practice and future research.

7.2 INTEGRATED SUMMARY

Risk and protective factors for offending in ADHD

The first two studies described in this dissertation were conducted to provide insight into interpersonal risk and protective factors for offending in ADHD and individuals with related self-regulatory problems. To this end, in **Chapter 2** we investigated parental risk and protective factors in the associations between effortful control and adolescent psychopathology. In adolescence, there is increasing pressure on individuals' ability to self-regulate behavior (e.g., Pérez-Edgar, 2015). From this period on, increasing individuation and autonomy become more and more important in growing up to become a healthy, and

well-functioning adult. Therefore, we argued that adolescents with poor effortful control are at increased risk for psychopathological problems and need more parental involvement to help them cope with new demands, and to buffer this risk. Our results partly supported our hypothesis in boys, as higher levels of perceived parental autonomy support (i.e., less involvement) exacerbated negative associations between self-reported effortful control and rule-breaking behavior. In contrast, in girls this was the case for more parental involvement (i.e., less autonomy support). Furthermore, in both genders, more parental involvement exacerbated negative associations between effortful control and internalizing problems. These results indicate that individuals with poor self-control are at increased risk for psychopathological problems but that interpersonal factors can impact this association in various ways, depending on other personal risk factors as well.

In **Chapter 3,** we studied the role of interpersonal risk factors in relationship to self-reported externalizing problems in forensic adult patients with ADHD. As noted throughout this dissertation, ADHD and offending both have been associated with psychosocial impairment, and therefore we expected poor social support and attachment insecurity to be risk factors for offending behavior in forensic patients with ADHD. Results showed that forensic patients with ADHD had higher levels of externalizing behaviors and insecure attachment styles, and lower levels of secure attachment compared to healthy, and at risk control males with (a history of) psychological problems from the general population. Furthermore, when multivariate associations were tested within the total sample, insecure attachment styles were associated with higher levels of *all* externalizing behaviors examined. For some externalizing behaviors, this association even seemed to exist above and beyond other personal risk factors that distinguished the three study groups. In contrast to what we expected, associations between interpersonal factors and externalizing behaviors were not more pronounced in forensic patients with ADHD. Also, poorer social support was not associated with forensic ADHD in this study, nor was it a risk or protective factor for externalizing behavior, when controlling for attachment styles.

Together, these findings thus supported our hypothesis that interpersonal factors can increase risk for offending behaviors in forensic patients with ADHD and youth with related (although less severe) self-regulatory problems. However, the extent to which this was the case, depended on the type of interpersonal factors investigated (e.g., social support seemed less important than attachment styles and parenting), and possibly, their relative weight in comparison to other risk and protective factors. In line with previous work (e.g., Bates, Pettit, Dodge, & Ridge, 1998; Kiff, Lengua, & Zalewski, 2011), our finding of Chapter 2 on rule-breaking in boys with poor effortful control suggest that for higher risk individuals, less environmental interference can increase externalizing behaviors. Yet, this finding did not extend to youths' engagement in interpersonal aggression: only direct associations with parenting and poor effortful control were related to this outcome. Regardless of parenting, youth with poor effortful control seem thus at increased risk for aggressive behavior. Furthermore, results of Chapter 3 point to attachment insecurity as

a general risk factor for externalizing problems in adult males. For some externalizing behaviors, attachment styles seemed even more important than other risk factors that distinguished forensic patients with ADHD from the investigated control groups in this study. Yet, again: this was not the case for aggression. Levels of aggression were increased in forensic patients with ADHD, regardless of attachment styles. In line with previous research (González, Gudjonsson, Wells, & Young, 2013; Retz & Rösler, 2010), these results thus also suggest that ADHD symptoms or related self-regulation problems, are particularly important (i.e., directly associated) risk factors for reactive forms of externalizing behavior, including aggression (Chapter 2 and 3), and possibly anger too (Chapter 3). As such, it is likely to argue that interpersonal factors are less influential in explaining such risk and offending behaviors.

Regarding protective factors for offending, we did not find any support for buffering effects of interpersonal factors on externalizing behaviors in forensic patients with ADHD, or youth with poor self-regulation for that matter. In Chapter 3, results indicated that secure and preoccupied attachment styles could lower some externalizing problems, but only in males from the general population. Additionally, it should be stressed that although parenting was associated with psychopathology in (healthy) youth with poor self-control (Chapter 2), the predominant finding was that adolescents with poor self-control reported more psychopathological problems, regardless of other factors examined. As such, this dissertation further supports the notion that interpersonal factors are not always strong enough to buffer and protect against various risk factors present in high risk individuals (Cusick, Havlicek, & Courtney, 2012), or particularly important factors, such as poor self-control. Alternatively, in line with what we argued to explain our finding that both higher and lower levels of parental interference were associated with some type of problem behavior in boys with poor self-control (Chapter 2): it is possible that 'optimal' levels of interpersonal involvement are needed to support healthy development in individuals with poor self-control. We did not have the data to examine such 'optimal' levels of interpersonal involvement, which can also explain our lack of findings on interpersonal factors as buffering effects for problem behaviors in individuals with poor self-control or ADHD.

Importantly, it should be noted that because of the small sample sizes of forensic patients with ADHD in this dissertation, we were unable to test interactions between (inter)personal risk and protective factor within patients. Because of the psychopathological and psychosocial heterogeneity within these patients (Scully, Young, & Bramham, 2014; Willcutt et al., 2012), it might be possible that in patients with secure attachment, social support *can* buffer against the other risk factors, whereas for patients with insecure attachments, it cannot. Similarly, effects of specific parenting behaviors on psychopathology also depend on the quality of the relationship between youth and their parents (Lamborn & Steinberg, 1993). We highly recommend future research to examine these interactions in more detail.

Responsivity to treatment and research compliance in forensic psychiatry

The second aim of this dissertation was to provide insight into personal and interpersonal risk and protective factors associated with responsivity for treatment and research compliance in forensic patients with ADHD. In **Chapter 4** we therefore examined research compliance in adult forensic patients with ADHD by examining the feasibility of previous study recommendations for difficult or 'hard-to-reach' study populations in 52 forensic outpatients with ADHD. We developed a tailor-made research design on the basis of specific personal and interpersonal factors expected to complicate research in forensic patients with ADHD and explored its feasibility using a pilot and follow-up study. Despite these efforts, we experienced that patients' psychiatric and functional impairments complicated the research process on multiple levels, including participant inclusion, standardized assessment, and compliance. Regarding interpersonal factors: getting patients' permission to engage network members to participate in the study, getting into contact with them, and receiving ongoing support from therapists were challenging. To deal with these issues, the clinical experience and visibility of the researchers within the outpatient center in which the study was conducted, were key. Also, taking an individualized approach in supporting patients' and therapists' study engagement was needed. Therefore, we concluded that researchers focusing on this and similar hard-to-reach patient samples should investigate time in building a steady alliance with their (possible) future participants and significant others, to enhance research compliance among these patients.

In **Chapter 5** we tested patients' treatment compliance. In particular, we examined associations between ADHD symptom severity, self-reported comorbid psychopathological symptoms, and psychosocial functioning in relationship to treatment no-shows, using a retrospective research design. Results showed that more self-reported externalizing (i.e., antisocial) problems were associated with more treatment no-shows in forensic outpatients with ADHD. There was also a trend in which the severity of patients' ADHD symptoms, as measured by scores on a semi-structured diagnostic interview assessed at the start of their treatment, was associated with increased no-show rates. Yet, this findings was not supported when ADHD symptoms were assessed with patients' self-reports on the Adult Self-Report (Achenbach & Rescorla, 2013) at time of research inclusion. Moreover, in contrast to what we expected, substance use, and psychosocial functioning were unrelated to treatment no-show in this study.

In **Chapter 6,** we used a prospective research design to examine treatment compliance in forensic patients with ADHD. We tested whether cognitive-motivational problems, comorbid externalizing problems, and interpersonal factors associated with ADHD symptoms and offending, were associated with treatment compliance, and no-show on the research appointment. To this end, patients participated in cognitive computer tasks and filled-out self-reports. Thereafter, treatment compliance was tracked for 10 appointments at the outpatient center. Results showed that higher self-reported impulsivity was associated with no-show on research, and more alcohol use with longer treatment

time intervals (i.e., duration in days between the maximum of 10 treatment appointments). Yet, higher self-reported delay aversion was associated with *fewer* treatment no-show. Moreover, uncontrolled for alcohol use, impulsivity was associated with *shorter* treatment time intervals in a subsample of patients. Finally, neither interpersonal functioning, nor any of the cognitive-motivational variables assessed by the computer tasks, were related to these outcomes in the final analyses.

In line with our hypotheses, these results thus showed that personal risk factors, including comorbid externalizing problems (i.e., antisocial personality problems (Chapter 5) and alcohol use (Chapter 6)), and psychiatric complexity more generally (Chapter 4), can negatively impact treatment and research compliance in forensic outpatients with ADHD. Yet, results on the role of ADHD core symptoms, and underlying cognitive-motivational problems related to ADHD and offending, were less clear. In Chapter 5 we found mixed results on whether or not the severity of patients' ADHD symptoms were related to no-show rates in treatment. Moreover, in Chapter 6, results showed that impulsivity was associated with no-show on the research appointment, but also with shorter treatment time intervals to finish the fixed number of treatment appointments. Additionally, higher self-reported delay aversion was associated with *less* no-show on treatment. We explained these findings by arguing that cognitive-motivational deficits in ADHD can also result in direct (i.e., impulsive) action, particularly when the action is concerned with something that patients with ADHD enjoy, are motivated for, or (directly) rewarded by. Many patients who participated in our study reported high motivation for treatment. Alternatively, we argued that cognitive-motivational deficits can cause more suffering and distress in patients, which in turn, motivates treatment planning and actually showing up. In previous research, more distress was also associated with treatment motivation and compliance in other patient samples (e.g., Centorrino et al., 2001; Grunebaum et al., 1996). Higher levels of cognitive-motivational deficits in patients might have enhanced therapists' efforts to keep them engaged too.

Finally, in contrast to our expectations, none of the interpersonal factors examined in this dissertation (i.e., quality of relationships with friends and family (Chapter 5), social support, and attachment styles (Chapter 6), as reported by patients) was associated with treatment and research compliance. This lack of findings seem counterintuitive, and contrasts with previous studies on the role of social support and attachment in therapy (e.g., Feitsma, Popping, & Jansen, 2012; Levy, Ellison, Scott, & Bernecker, 2011). Yet, these null findings can be explained in numerous ways. For example, it is possible that we were unable to capture the relevant interpersonal information that is associated with treatment and research compliance by the measurements we used to assess interpersonal factors here (see methodological considerations). Moreover, as noted in Chapter 6, it is tentative to argue that because patients already feel supported to be treatment compliant by their therapists, external social network members may be less influential in this regard. Similarly, from the research participant inflow described in Chapter 4 it can be concluded

that, if therapists made an effort to include patients into research, they seemed successful in stimulating patients to be research compliant. All patients were recruited via their therapists, and although a high number of patients did not participate because they were not asked, of those who were asked, only 3 initially refused. Finally, it can be argued that because we only recruited patients from a specialized treatment program on forensic adult ADHD, therapists working in the program may have been particularly skilled to cope with difficult patient behaviors, and therefore interpersonal factors were not associated with treatment responsivity. Similarly, in our research we tried to be very responsive to challenging patient behavior throughout the entire research process (Chapter 4). In previous studies on patients with severe psychiatric problems, it has indeed been indicated that positive therapist factors can enhance the therapeutic relationship with these patients, regardless of difficult interpersonal patient factors (Evans-Jones, Peters, & Barker, 2009). In turn, this relationship then, can protect patients against poor treatment responsivity (Dixon, Holoshitz, & Nossel, 2016).

7.3 METHODOLOGICAL CONSIDERATIONS

The current findings should be interpreted with some methodological considerations in mind. First, the small patient sample sizes on which we conducted the studies described in Chapter 3, 5 and 6, limited their statistical power, and enhanced chances of type I and type II errors: this might have impacted the results (Christley, 2010). Additionally, as noted throughout this dissertation: the specificity and demographic similarity of these small patient samples (e.g., most were relatively young males, with a history of offending, ADHD, comorbid externalizing problems, and all received treatment within one outpatient center in The Netherlands specialized in the treatment of ADHD) further limits the generalizability of our findings to other forensic patients and offenders with ADHD. Moreover, many patients with ADHD included in our studies had comorbidities with other disorders with overlapping symptoms (e.g., autism spectrum disorders, mood -, and personality disorders). This usually makes it difficult to differentiate ADHD from a number of other conditions (Kooij et al., 2010; Weiss & Weiss, 2004), and can result in the under- and misdiagnosis of ADHD in forensic samples (Buitelaar & Ferdinand, 2016; Young et al., 2014; Young & Cocallis, 2019). For the current research, this means that the identified risk factors for offending and responsivity factors for treatment and research compliance here can also be related to similar psychiatric problems of associated disorders, rather than to ADHD in forensic patients.

Furthermore, as is often the case with research on 'hard-to-reach' patient samples, the patients who participated in our studies, reflected only a small proportion of the actual number of patients who received treatment within the ADHD program during the time (see for example Chapter 4). Many patients dropped out of treatment or were referred to another clinic before we had the chance to include them in research. This suggests that

this research is based on forensic patients with ADHD who are less severely impaired, or more motivated for treatment and research than those who were not included. Hence, this leaves out important information on patients' non-compliance and drop-out. Given these limitations, the results of this dissertation should be considered exploratory, and replication in larger, more diverse patient samples is warranted to further disentangle which risk and responsivity factors relate specifically to adult ADHD, which to ADHD in forensic psychiatry, and which to forensic psychiatry more generally. Nevertheless, to our knowledge, this dissertation is one of the first to shed light on the representativeness of forensic (out)patients with ADHD who do get included into research and treatment (see also Buitelaar, Posthumus, Bijlenga, & Buitelaar, 2019), and the challenges and research strategies needed to accomplish this.

A final limitation concerning the study samples used in our research concerns the use of the adolescent sample in Chapter 2. This population was very different in terms of problem severity and psychosocial functioning from the population of forensic patients with ADHD. Nevertheless, examining interactions between risk and protective factors in relationship to problem behaviors in this youth, provided insight into the complexity of these interactions more generally. It is thus likely this complexity is more pronounced in forensic patients with ADHD.

Other methodological considerations concern the way in which some of our study variables were assessed. First, a number of questionnaires that we used, had not yet been tested in forensic psychiatric samples. In forensic patients, poorer intellectual functioning is quite common (Wilson & Hernstein, 1985). In order to enhance research compliance in patients with lower literacy levels, we edited the standardized questionnaires to some degree by providing additional self-constructed word lists in which the meaning of difficult language was explained. Patients might therefore have interpreted the meaning of some items differently, which explains for example why the reliability of the dismissive attachment subscale (i.e., 4 items of the Attachment Styles Questionnaire; Van Oudenhoven, Hofstra, & Bakker, 2003) was insufficient when tested in a sample of forensic patients with ADHD only ($\alpha = .46$; Chapter 6), whereas it was not when males from the general population were included ($\alpha = .61$; Chapter 3).

Second, regarding treatment compliance, we want to stress that some of our findings may have been influenced by differences in patients' treatment progress. Although we statistically controlled for patients' treatment backgrounds, the different treatment phases in which patients' no-shows and treatment time durations were tracked, may still have influenced the results. For example, the timing of no-show within treatment courses seems important to identify some specific risk factors. Hence, some factors can be more relevant at the beginning of therapy (e.g., whether patients are in mandatory treatment or in voluntary treatment), whereas others likely become more important towards the end (e.g., the progress already made, the remaining level of distress). Moreover, previous research indicated that the influence of some risk factors on treatment compliance can change throughout the

course of treatment. In a study on forensic outpatients with substance use disorders, it was shown for example, that although patients who received mandatory treatment were less motivated at the beginning of treatment, at the end, they were more likely to have finished the 6-month program than those patients who participated voluntarily (Coviello et al., 2013). Furthermore, treatment and research compliance were only assessed by patients' no-shows, and treatment duration time intervals, which of course also leaves out other important information on compliant patient behavior (e.g., Sung, Belenko, & Feng, 2001). For example, we did not know how well patients were engaging during the therapy sessions they attended, or adhered to treatment rules in general. This engagement is important to include in future research on treatment responsivity in forensic patients with ADHD.

Third, the fact that interpersonal factors were based on patients' and youths' self-reports is an additional limitation of our research. We tried to include data from social network members on their provided support to patients. Yet, a number of patients did not allow us to contact network members and we were unable to reach a number of networks members too. Because of this missing data, we could not include these reports in a meaningful way. We thus only included the perspectives of patients and adolescents on their relationships with others, which likely are biased by other factors, such as their attachment styles (e.g., Collins & Feeney, 2004; Florian, Mikulincer, & Bucholtz, 1995). Including the perspectives of social network members in future research seems highly important, in particular because personal factors of these members (e.g., their attachment styles, communicative abilities, criminogenic attitudes) may also contributing to the way in which these relationships influence patients' functioning. Moreover, including information on the therapeutic relationship seems key in understanding associations between interpersonal functioning and treatment responsivity in forensic patients with ADHD.

Finally, the most important methodological consideration concerns the fact that all studies in this dissertation, except for the one described in Chapter 6, were based on cross-sectional data. Therefore, it is possible that the factors interpreted here as risk and responsivity factors for offending and treatment and research non-compliance in forensic patients with ADHD, are in fact, the result of these outcomes. Longitudinal research is needed to investigate the directions of effects.

7.4 CLINICAL IMPLICATIONS AND (FINAL) DIRECTION FOR FUTURE RESEARCH

In providing clinical implications from our research, we return to the RNR model of forensic psychiatric rehabilitation. In this dissertation, we showed that some interpersonal risk factors can enhance offending behavior in forensic patients with ADHD. Because these interpersonal factors (i.e., criminogenic needs) are expected to be able to change through therapy (Levy et al., 2011), these should thus be targeted in forensic treatment according to the RNR principles. Given our findings on insecure attachment styles, this suggests

that attention should be given to the way in which forensic patients with ADHD view themselves and others in terms of trust and support. Moreover, because social support was not associated with any of the externalizing behaviors examined after controlling for attachment, this calls for more professional awareness that including network members in patients' rehabilitation, without also focusing on patients' attachment difficulties, might not be enough for patients to profit from this enhancement of support. More research is needed on attachment styles in forensic patients with ADHD, and on how these styles are reflected in their day to day interactions with network member, and their therapeutic relationships too. Similarly, more knowledge on what behaviors others use to support patients, and whether these are sufficient in diminishing problem behavior and enhancing general well-being, is warranted to get a better understanding of interpersonal functioning in forensic patients with ADHD. Similar to what we argued regarding social support for boys with poor effortful control (Chapter 2), it can be argued that a helpful and protective environment for forensic patients with ADHD, not only includes supportive behaviors but also more controlling social network behavior to help them refrain from offending. Furthermore, our findings on associations between externalizing problems and treatment non-compliance in forensic patients with ADHD, and the role of cognitive-motivational functioning in research and treatment compliance, can help clinical practice and researchers in identifying patients at risk for poor responsivity. In treatment, assessing these problems at the beginning of therapy, can provide the opportunity to include compliance as an additional treatment goal for high-risk patients. Informing patients about the risks associated with no-show and drop-out, and seeking possible solutions to overcome these problems together, can be additional starting points for treatment.

Regarding the protective role of impulsivity and delay aversion in treatment planning and showing up for treatment, we want to stress that if these findings indeed can be explained by arguing that they reflect patients urge for immediacy or direct stimulation (i.e., rather than patients' levels of distress), then over time, they can become risk factors for treatment non-compliance too. Hence, it has been suggested that engagement in psychological treatment can be viewed as a real life temporal reward discounting paradigm, which is influenced by patients', often, unrealistic expectations about how fast individuals recover from therapy (Swift & Callahan, 2009). A discrepancy between patients' treatment expectations (i.e., quick recovery, and therefore receiving quick, immediate reward) and the actual effectiveness of psychotherapy (it takes time and effort to significantly improve, and therefore treatment completion is usually a larger future reward), may result in people discounting treatment before completion. As such, high impulsive and delay aversive patients might drop out of treatment, or do not stay engaged throughout the entire treatment if they experience that it takes 'too long' to obtain behavioral change. 'Pretherapy' preparation techniques, such as discussing patients' expectations and misconceptions about therapy can help to diminish discounting, and subsequently enhance treatment compliance in some patients (Ogrodniczuk, Joyce, & Piper, 2005). Yet,

to date it is unclear whether these techniques are also effective in more severely impaired patients, such as those with (comorbid) personality problems (McMurran, Huband, & Overton, 2010). To enhance patients' motivation throughout therapy, therapists might search for constant direct rewards, and stimulating ways to shape the therapy sessions. Planning and objectifying different behavioral and psychosocial changes that help patients in obtaining their ultimate treatment goal(s), and identifying and celebrating small steps towards reaching these goals, may also stimulate compliance. Finally, another strategy to counteract treatment discounting or delay aversive behaviors has been developed in a meta-cognitive therapy for (non-offending) adults with ADHD (Solanto et al., 2010). In this treatment, patients learn to mentalize the long-term rewards, which they aim to obtain through therapy (or through other effortful behaviors needed to obtain long-term goals), and visualize these when executing present behavior. This treatment strategy is intended to increase the salience of long-term rewards, so that this can be used to stimulate active engagement in the present (Solanto, Surman, Ma, & Alvir, 2018). More research is warranted to examine the extent to which cognitive-motivational impairments in forensic patients with ADHD are related to responsivity in treatment, and treatment engagement over time. Yet, in the meantime, professionals working with these patients can already try applying these strategies to reward compliant behavior and enhance sustained motivation.

7.5 GENERAL CONCLUSION

To conclude, in line with previous research, the findings from this dissertation showed that individuals with poor self-control are at risk for offending and other problem behaviors. Interpersonal factors, and insecure attachment styles in particular, can enhance this risk in forensic patients with ADHD, youth and adult males from the general population. We did not find any support for buffering effects of interpersonal factors in this regard. Furthermore, personal risk factors related to ADHD and offending, including comorbid externalizing problems, and cognitive-motivational functioning, influenced research and treatment compliance in forensic outpatients with ADHD. Yet, interpersonal factors, including patients' self-reported quality of their relationship with friends and family, social support, and attachment styles, did not. Further research is needed to examine how interpersonal problems in forensic patients with ADHD are reflected in their (daily) interactions with significant others, before more can be concluded on how interpersonal factors contribute to risk and responsivity in forensic patients with ADHD. Finally, more research is needed on the specific role of ADHD symptoms, and related cognitive-motivational functioning on treatment motivation in forensic psychiatry to provide patients with the right level(s) and type(s) of ongoing support during the entire course of treatment.

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Nederlandse samenvatting

(Summary in Dutch)

NEDERLANDSE SAMENVATTING (SUMMARY IN DUTCH)

Volwassen patiënten met aandachtsdeficiëntie-/hyperactiviteitsstoornis (ADHD) hebben vaak meerdere risicofactoren die in verband zijn gebracht met delinquent gedrag. Zo is er bij patiënten met ADHD vaak sprake van ernstige impulsiviteit en een grotere motivatie voor directe behoeftebevrediging. Daarnaast kan er sprake zijn van gedragsproblemen, zoals middelenmisbruik en antisociaal gedrag en sociale problemen die zich uiten in onveilige hechting, een gebrek aan ondersteuning en conflicten met de directe omgeving (e.g., Bramham & Giollabhui, 2016; Thorell, Sjöwall, Mies, & Scheres, 2017; Young, Toone, & Tyson, 2003). Tot op heden is er weinig onderzoek gedaan naar hoe deze factoren gerelateerd zijn aan (herhaald) delictgedrag bij forensische patiënten met ADHD. Daarnaast is er weinig bekend over hoe interpersoonlijke factoren het risico op delictgedrag kunnen verhogen of juist verlagen bij deze groep patiënten en bij andere groepen die moeite hebben om hun gedrag te reguleren. Tot slot is er weinig klinische en wetenschappelijke kennis over hoe deze factoren gerelateerd zijn aan behandeltrouw en onderzoek bij patiënten met ADHD binnen de forensische psychiatrie.

In dit proefschrift is daarom onderzoek gedaan naar interpersoonlijke risico- en beschermende factoren voor delictgedrag bij volwassen forensische patiënten met ADHD. Deze patiënten werden behandeld in een poliklinisch forensisch centrum in Rotterdam. In deze groep werd ook onderzocht hoe deze factoren samenhingen met behandeltrouw en deelname aan wetenschappelijk onderzoek bij forensische patiënten met ADHD. Daarnaast is er onderzoek verricht bij jongeren uit de algemene bevolking met gerelateerde regulatieproblemen.

Het 'Risk-Need-Responsivity' (RNR; Andrews, Bonta, & Hoga, 1990) model vormt de theoretische basis van dit onderzoek, zoals het ook de basis vormt van veel behandelprogramma's in de forensische psychiatrie. In het kort beschrijft dit model *wie*, *wat* en *hoe* behandeld moet worden binnen de forensische zorg. Het risicoprincipe beschrijft dat (meer intensieve of langdurige) behandeling moet worden gegeven aan mensen met (een hoger) risico op (herhaald) delictgedrag; het behoefteprincipe beschrijft dat behandeling zich moet richten op de risicofactoren voor delictgedrag die veranderbaar zijn; en het responsiviteitsprincipe beschrijft dat de manier waarop behandeling wordt aangeboden, moet aansluiten bij de sterktes en zwaktes van patiënten. Vanuit het RNR-perspectief zijn forensische patiënten met ADHD hoog-risico individuen die dus intensief behandeld moeten worden om (risico op) delictgedrag te verminderen. De huidige kennis over de risico- en/of responsiviteitsfactoren waarop de behandeling zich moet richten om behandeltrouw en behandelsucces te verhogen, is echter schaars. Meer onderzoek is daarom nodig om delictgedrag in forensische patiënten met ADHD te verminderen en het welzijn van patiënten te verhogen.

Hier volgt een overzicht van de studies die in dit proefschrift werden beschreven en de belangrijkste bevindingen. We sluiten af met een beschrijving van enkele klinische implicaties, suggesties voor vervolgonderzoek en een algemene conclusie.

Risico- en beschermende factoren voor delictgedrag bij ADHD

Het eerste doel van dit proefschrift was om meer inzicht te geven in interpersoonlijke risico- en beschermende factoren voor delictgedrag in forensische patiënten met ADHD en jongeren met regulatieproblemen in algemenere zin. Kennis van hoe deze factoren samenhangen met delictgedrag, geeft inzicht in welke factoren aandacht verdienen in een forensische behandeling. In **Hoofdstuk 2** onderzochten we daarom de rol van ouderlijk gedrag in het verband tussen zelfregulatie ('effortful control') en zelf-gerapporteerde probleemgedragingen bij adolescenten. Deze studie is in het huidige proefschrift van belang omdat de mate waarin mensen in staat zijn om hun eigen gedrag te reguleren een belangrijke rol speelt in het verklaren van toenemend probleemgedrag in de adolescentie. In de adolescentie wordt in toenemende mate van jongeren verwacht dat ze autonomer worden, zodat ze kunnen opgroeien tot gezonde en zelfstandige volwassenen. De verwachting in dit proefschrift was daarom dat jongeren met *minder* zelfregulatie een *verhoogd risico* zouden hebben op het ontwikkelen van problemen in deze fase en dat zij een hogere mate van ouderlijke betrokkenheid nodig hebben om zich tegen dit risico te beschermen. De resultaten ondersteunden deze verwachtingen deels in jongens: een hogere mate van autonomie-ondersteuning door ouders (i.e., minder ouderlijke betrokkenheid) versterkte het negatieve verband tussen zelfregulatie en regelovertredend gedrag bij jongens. Bij meisjes was dit echter het geval bij meer ouderlijke betrokkenheid. Meer ouderlijke betrokkenheid versterkte voor zowel jongens als meisjes het negatieve verband tussen zelfregulatie en internaliserende problemen (i.e., depressieve en angstklachten, in dit onderzoek). Deze resultaten suggereren dat jongeren met minder zelfregulatie een verhoogd risico hebben op probleemgedrag en dat interpersoonlijke factoren dit verband op verschillende manieren kunnen beïnvloeden, afhankelijk van overige (persoonlijke) risicofactoren.

In **Hoofdstuk 3** werd het verband tussen interpersoonlijke risicofactoren en zelf-gerapporteerde gedragsproblemen in volwassen forensische patiënten met ADHD onderzocht. Omdat zowel ADHD als delictgedrag in eerder onderzoek gerelateerd waren aan meer psychosociale problemen, verwachtten we in onze studie dat het krijgen van minder sociale steun én het hebben van hechtingsproblemen twee risicofactoren zouden zijn die de kans op delictgedrag in forensische patiënten met ADHD zouden vergroten. In lijn met deze verwachtingen toonden de resultaten dat forensische patiënten met ADHD meer gedragsproblemen en onveiligere hechtingsstijlen rapporteerden en minder veilige hechting in vergelijking met een controlegroep van gezonde volwassen mannen en een risicogroep van mannen met (een verleden van) psychische klachten uit de algemene bevolking. In de totale onderzoeksgroep hingen onveilige hechtingsstijlen positief samen met zelf-gerapporteerde gedragsproblemen, waaronder antisocialiteit, agressie, hostiliteit en woede.

Voor enkele van deze problemen leek dit positieve verband tussen onveilige hechting en gedragsproblemen zelfs belangrijker dan de invloed van andere risicofactoren die de drie onderzoeksgroepen van elkaar onderscheidden. In tegenstelling tot onze verwachtingen bleek de mate van sociale steun, zoals gerapporteerd in dit onderzoek, niet te verschillen tussen de drie groepen. Ook bleek sociale steun geen risico- of beschermende factor te zijn voor probleemgedrag, wanneer rekening werd gehouden met de mate van veilige of onveilige hechting in dit onderzoek.

De resultaten van deze studies laten dus zien dat interpersoonlijke factoren het risico op delictgedrag in forensische patiënten met ADHD en individuen met soortgelijke regulatieproblemen inderdaad kunnen versterken. De mate waarin dat het geval is, hangt echter ook af van de specifieke interpersoonlijke factoren die worden onderzocht (bijv., sociale steun leek minder van invloed dan hechtingsstijlen of ouderlijk gedrag) en mogelijk het relatieve gewicht van deze factoren ten opzichte van overige risico- en beschermende factoren die aanwezig zijn. In overeenstemming met eerder onderzoek (e.g., Bates, Pettit, Dodge, & Ridge, 1998; Kiff, Lengua, & Zalewski, 2011), wijzen de resultaten van Hoofdstuk 2 erop dat in individuen met een hoog risico op probleemgedrag (bijv. jongens met regulatieproblemen), minder invloed vanuit de omgeving kan zorgen voor meer probleemgedrag. Dit was het geval voor regelovertredend gedrag door jongens, maar gold niet voor de mate van interpersoonlijke agressie bij jongeren. Jongeren met minder zelfregulatie rapporteerden namelijk meer interpersoonlijke agressie, ongeacht de mate van ouderlijke betrokkenheid. In Hoofdstuk 3 zagen we verder dat onveilige hechting een algemene risicofactor was voor gedragsproblemen in volwassen mannen. Voor sommige probleemgedragingen leek hechting zelfs belangrijker dan de rol van andere risicofactoren die de groep forensische patiënten met ADHD onderscheidde van de twee controlegroepen. Wederom was dit niet het geval voor zelf-gerapporteerde agressie. De huidige resultaten komen overeen met onderzoek waarin verondersteld wordt dat ADHD, of gerelateerde problemen met zelfregulatie, vooral belangrijke risicofactoren zijn voor reactieve vormen van probleemgedrag, zoals (impulsieve) agressie (González, Gudjonsson, Wells, & Young, 2013; Retz & Rösler, 2010). Het is mogelijk dat om deze reden, interpersoonlijke factoren als hechtingstijlen en sociale steun minder van invloed waren op dit gedrag in de huidige studies.

In tegenstelling tot de verwachtingen, waren er geen aanwijzingen voor de beschermende rol van interpersoonlijke factoren op het vertonen van delictgedrag in forensische patiënten met ADHD of in jongeren met gerelateerde regulatieproblemen. In Hoofdstuk 3 vonden we enkele aanwijzingen dat bepaalde hechtingsstijlen (gezonde en gepreoccupeerde hechting) de verbanden met gedragsproblemen konden verminderen, maar enkel in de groep gezonde mannen. Verder toonden de resultaten in Hoofdstuk 2 dat de mate van ouderlijke betrokkenheid samenhing met probleemgedragingen in jongeren, maar de meest robuuste bevinding was hier dat jongeren met minder zelfregulatie meer probleemgedrag rapporteerden, ongeacht de door hen ervaren mate van ouderlijke betrokkenheid. De

huidige resultaten ondersteunen daarom ook eerdere argumenten dat interpersoonlijke factoren niet altijd voldoende sterk zijn om bescherming te bieden tegen een veelheid aan risicofactoren (Cusick, Havlicek, & Courtney, 2012), of de aanwezigheid van bepaalde belangrijke risicofactoren in hoog-risico individuen. Een alternatieve verklaring voor het gebrek aan bevindingen is dat in plaats van te onderzoeken of een hoge of lage mate van betrokkenheid van de omgeving beschermend kan zijn in dit verband (zoals in dit proefschrift is gedaan), het ook belangrijk is om te kijken naar meer optimale niveaus van betrokkenheid van de omgeving, zoals de mate van controle, tezamen met een bepaalde mate van steun. Mogelijk is een dergelijke optimale balans in betrokkenheid van de omgeving nodig om het risico op probleemgedrag te verminderen in individuen met regulatieproblemen.

Responsiviteit in behandeling en wetenschappelijk onderzoek binnen de forensische psychiatrie

Het tweede doel van dit proefschrift was om meer inzicht te geven in persoonlijke en interpersoonlijke risico- en beschermende factoren voor medewerking aan onderzoek en behandeltrouw bij forensische patiënten met ADHD. In **Hoofdstuk 4** onderzochten we daarom responsiviteitsfactoren voor deelname aan wetenschappelijk onderzoek. Specifiek onderzochten we in welke mate onderzoeksadviezen uit eerdere studies naar 'moeilijk te bereiken' ('hard-to-reach') doelgroepen, toereikend waren voor onderzoek naar forensische poliklinische patiënten met ADHD en hun sociale omgeving. Op basis van specifieke persoonlijke en interpersoonlijke factoren waarvan verwacht werd dat ze onderzoek in forensische patiënten met ADHD zouden bemoeilijken, ontwikkelden we een onderzoeksdesign op maat. Vervolgens beschreven we de werkbaarheid van dit design aan de hand van een pilot- en vervolgstudie in 52 forensische patiënten met ADHD. Ondanks de zorgvuldige aandacht voor het onderzoekdesign, werd de uitvoer van het onderzoek op verschillende niveaus bemoeilijkt door de psychiatrische complexiteit van de doelgroep en gerelateerde functionele beperkingen (bijv. beperkt begrip van wetenschappelijk onderzoek). Voornamelijk de inclusie van participanten en hun sociale omgeving, afname van het onderzoeksmateriaal op gestandaardiseerde wijze en het voorkomen van uitval van participanten bleken uitdagend. Interpersoonlijke factoren zoals het krijgen van toestemming van patiënten om sociale contacten telefonisch te interviewen, met deze mensen in contact komen en het krijgen en vasthouden van steun van therapeuten om patiënten te includeren, bleken uitdagend. Verder was het hebben van klinische ervaring waardevol, evenals een goede zichtbaarheid als onderzoeker in de polikliniek waar het onderzoek werd uitgevoerd en het hanteren van een persoonlijke benadering in het ondersteunen van patiënten en therapeuten bij hun onderzoeksdeelname. Deze resultaten suggereren dus dat onderzoekers van 'moeilijk te bereiken' doelgroepen moeten investeren in het bouwen aan relaties met (mogelijke) toekomstige participanten, hun sociale netwerk

én andere betrokkenen om succesvolle deelname aan wetenschappelijk onderzoek in dergelijke groepen te verhogen.

In **Hoofdstuk 5** onderzochten we responsiviteitfactoren in behandeling. Specifiek toetsten we de verbanden tussen de ernst van ADHD-symptomen, bijkomstige zelf-gerapporteerde psychopathologie en psychosociale problemen met het niet komen opdagen op behandelafspraken (zogeheten 'no-show') in forensische patiënten met ADHD. Zoals verwacht, bleken gedragsproblemen (antisociaal gedrag) in dit onderzoek samen te hangen met meer no-show in de forensische poliklinische behandeling. Ook was er een trend waarin de ernst van de ADHD-symptomen van patiënten, zoals gemeten met een diagnostisch interview aan het begin van de behandeling, leek samen te hangen met een hoger no-show percentage. Dit verband werd niet gevonden wanneer we dit onderzochten met zelf-gerapporteerde informatie over ADHD-symptomen van patiënten. Ook vonden we geen verbanden tussen middelengebruik en psychosociale factoren, zoals de kwaliteit van vriendschap- en familierelaties, met no-show in deze studie. Een belangrijke beperking van dit onderzoek was dat we gebruik maakten van een retrospectief onderzoeksdesign om no-shows in kaart te brengen. Informatie over no-shows werd ten tijde van deelname aan het onderzoek opgevraagd over de gehele behandelperiode voorafgaand aan deze deelname. Het was daarom niet mogelijk om de risicofactoren die we in deze studie onderzochten te linken aan specifieke momenten van no-shows in de tijd, wat de interpretatie van enkele van deze resultaten bemoeilijkte.

In **Hoofdstuk 6** onderzochten we daarom ook behandelresponsiviteit in forensische patiënten met ADHD met een prospectief onderzoeksdesign. In deze studie probeerden we de resultaten van Hoofdstuk 5 te repliceren. Daarnaast gingen we een stap verder door te toetsen in welke mate beperkingen in cognitieve functies, motivatie, gedragsproblemen, en interpersoonlijke problemen passend bij ADHD en delinquent gedrag, samenhingen met behandeltrouw en no-show op onderzoek. Cognitieve functies zorgen ervoor dat informatie uit de omgeving op een juiste manier in de hersenen verwerkt wordt, zodat we als mens doelgericht kunnen handelen. Beperkingen in deze cognitieve functies (zoals passend bij ADHD) kunnen bijvoorbeeld zorgen voor problemen met zelfregulatie en impulsief handelen. Deze zaken werden in kaart gebracht met behulp van zelf-rapportages van patiënten en hun scores op een aantal cognitieve computertaken. Na de onderzoeksafspraak werd de therapietrouw gevolgd voor de eerste tien geplande behandelafspraken met behulp van elektronische patiëntendossiers. In overeenstemming met onze verwachtingen lieten de resultaten zien dat een hogere mate van zelf-gerapporteerde impulsiviteit samenhing met no-show op de onderzoeksafspraak, en dat meer alcoholgebruik samenhing met een langere duur om de tien afspraken af te ronden. In tegenstelling tot onze verwachtingen, bleek echter dat een hogere mate van zelf-gerapporteerde aversie voor wachten ('delay aversion') samenhing met *minder* no-show in behandeling. Omdat vaak wordt verondersteld dat 'delay aversion' in ADHD de motivatie voor het handelen naar directe beloning versterkt (Sonuga-Barke, 2003), werd verwacht dat meer 'delay aversion' juist zou zorgen voor

minder responsiviteit in behandeling. Het volgen van psychologische behandeling wordt vaak pas beloond na veel inspanning en tijd met een afname in klachten en is daarmee eerder een uitgestelde dan een directe beloning. Verder bleek dat als we in de analyses geen rekening hielden met de mate van alcoholgebruik, meer impulsiviteit ook samenhing met een *minder* lange duur om de tien behandelafspraken af te ronden. Interpersoonlijke factoren (sociale steun en hechtingstijlen) of scores op de cognitieve computertaken bleken in deze studie niet samen te hangen met de uitkomsten in de hoofdanalyses.

De resultaten van deze studies samen laten dus zien dat persoonlijke risicofactoren, zoals gedragsproblemen en psychiatrische complexiteit in het algemeen, de responsiviteit voor behandeling en deelname aan onderzoek in forensische patiënten met ADHD negatief kunnen beïnvloeden. De rol van ADHD-symptomen en onderliggende cognitieve en motivationele beperkingen is in dit verband minder duidelijk. De resultaten van Hoofdstuk 6 wijzen erop dat impulsiviteit en 'delay aversion' in ADHD zowel risicofactoren kunnen zijn voor no-show op onderzoek, als een beschermende invloed kunnen hebben op de mate waarin patiënten behandelafspraken inplannen en hier daadwerkelijk op verschijnen. Dit kan mogelijk verklaard worden door te stellen dat deze kenmerken van ADHD de directe behoeftebevrediging stimuleren en daarmee resulteren in direct handelen. Dit is vooral waarschijnlijk wanneer dit handelen gepaard gaat met iets wat patiënten met ADHD leuk vinden, waar ze gemotiveerd voor zijn en/of waar ze direct voor worden beloond. Patiënten in dit onderzoek rapporteerden dan ook een hoge motivatie voor behandeling. Een alternatieve verklaring voor deze bevindingen kan zijn dat deze kenmerken zorgen voor meer lijdensdruk in patiënten met ADHD en dat dit is wat hen motiveert om regelmatig op behandelafspraken te verschijnen. In eerder onderzoek hing een verhoogde lijdensdruk ook samen met behandelmotivatie en behandeltrouw in andere patiëntgroepen (e.g., Centorrino et al., 2001; Grunebaum et al., 1996).

Tot slot, in tegenstelling tot onze verwachtingen hing geen van de door ons onderzochte interpersoonlijke factoren samen met behandeltrouw of no-show op onderzoek in forensische patiënten met ADHD. Dit lijkt contra-intuïtief en is in tegenspraak met eerder onderzoek naar de rol van sociale steun en hechting in behandeling (e.g., Feitsma, Popping, & Jansen, 2012; Levy, Ellison, Scott, & Bernecker, 2011). Dit gebrek aan bevindingen kan op verschillende manieren worden verklaard. Ten eerste is het mogelijk dat we belangrijke informatie over de contacten met anderen hebben gemist omdat enkel gebruik werd gemaakt van zelfrapportage van patiënten. Zo kan het perspectief van patiënten over hun relatie met de sociale omgeving gekleurd zijn door andere persoonlijke factoren, zoals hun hechtingsstijlen (e.g., Collins & Feeney, 2004; Florian, Mikulincer, & Bucholtz, 1995). Het includeren van het perspectief van de omgeving in vervolgonderzoek is daarom van groot belang. Verder is het mogelijk om het gebrek aan bevindingen te verklaren vanuit de mogelijkheid dat patiënten zich al gesteund hebben gevoeld voor deelname aan onderzoek en behandeling door hun therapeuten, en dat daarom de rol van andere netwerkleden hier minder van invloed is geweest. Ten slotte, in dit onderzoek hebben we enkel patiënten

geïncludeerd die in behandeling waren in een gespecialiseerd behandelprogramma voor ADHD en crimineel gedrag. Dit kan ervoor hebben gezorgd dat specifieke factoren van de therapeuten de resultaten hebben beïnvloed. Gezien de gespecialiseerde setting zou het kunnen zijn dat therapeuten extra vaardig waren in het omgaan met moeilijk gedrag en dat deze factoren daarom niet van invloed waren op de uitkomsten. In eerder onderzoek naar patiënten met ernstige psychiatrische problemen is gesuggereerd dat positieve factoren van therapeuten ervoor kunnen zorgen dat de therapeutische relatie versterkt wordt, ongeacht 'moeilijke' gedragingen van patiënten die het aangaan van dit contact bemoeilijken (Evans-Jones, Peters, & Barker, 2009). Een goede therapeutische relatie kan patiënten vervolgens beschermen tegen responsiviteitsproblemen in behandeling (Dixon, Holoshitz, & Nossel, 2016).

Klinische implicaties en vervolgonderzoek

De studies in dit proefschrift hebben enkele belangrijke methodologische beperkingen die meegewogen moeten worden bij het interpreteren van de bevindingen. We noemen hier de twee belangrijkste. De kleine en specifieke steekproeven van forensische patiënten met ADHD in onze studies beperken de mate waarin de bevindingen te generaliseren zijn naar andere forensische patiënten of delinquenten met ADHD. Replicatie in een grotere en meer diverse psychiatrische steekproef is nodig om zicht te krijgen op welke van de hier beschreven risicofactoren specifiek zijn voor delictgedrag en behandeling bij forensische patiënten met ADHD, welke voor volwassenen met ADHD, en welke voor de forensische psychiatrie in het algemeen. Verder vragen de cross-sectionele onderzoekdesigns van onze studies om replicatie in een longitudinaal onderzoekdesign. Dit is nodig om de richtingen van de verbanden verder te kunnen bepalen. Deze (en overige) methodologische beperkingen moeten in acht worden genomen bij de interpretatie van onderstaande klinische implicaties.

In dit proefschrift lieten we zien dat sommige interpersoonlijke factoren het risico op delictgedrag in forensische patiënten met ADHD kunnen verhogen. Omdat van deze factoren verwacht wordt dat ze kunnen veranderen door behandeling (e.g., Levy et al., 2011), verdienen ze volgens de principes van het 'Risk-Need-Responsivity' model dus aandacht in forensische behandelprogramma's. Zo suggereren onze bevindingen over hechting dat er in behandeling aandacht moet zijn voor hoe forensische patiënten met ADHD zichzelf en anderen zien in termen van vertrouwen en steun. Verder vragen onze bevindingen over sociale steun om meer professionele aandacht, omdat het betrekken van sociale netwerkleden in de behandeling van forensische patiënten met ADHD niet altijd voldoende zal zijn om hen ook daadwerkelijk van deze extra steun te kunnen laten profiteren. Ook is meer onderzoek naar hechtingsproblemen in forensische patiënten met ADHD van belang om meer kennis te vergaren over hoe specifieke hechtingsstijlen tot uiting komen in de dagelijkse interacties met het informele en formele sociale netwerk (waaronder de therapeut). Meer kennis over welke gedragingen anderen toepassen om patiënten te ondersteunen en in welke mate deze gedragingen effectief zijn in vermindering

van probleemgedrag lijkt ook belangrijk om de kennis over interpersoonlijk functioneren in forensische patiënten met ADHD te vergroten. De bevindingen in dit proefschrift over de verbanden tussen gedragsproblemen en de rol van cognitieve en motivationele beperkingen in relatie tot onderzoek- en behandeltrouw, kunnen klinische professionals en onderzoekers helpen om risicogroepen hieromtrent te identificeren. In behandeling biedt het vroegtijdig identificeren van deze problemen de mogelijkheid om behandeltrouw tot een expliciet behandeldoel te maken voor patiënten met een hoog-risico. Patiënten informeren over de risico's die gepaard gaan met no-show en uitval en samen met hen op zoek gaan naar mogelijke oplossingen om deze problemen te voorkomen, zijn overige aanknopingspunten.

De bevindingen dat impulsiviteit en 'delay aversion' in forensische patiënten met ADHD het plannen en nakomen van behandelafspraken kan stimuleren, vraagt extra aandacht. Als deze bevindingen inderdaad verklaard kunnen worden vanuit de gedachte dat directe behoeftebevrediging in patiënten met ADHD dit gedrag stimuleert (meer dan dat deze beperkingen zorgen voor een hogere lijdensdruk die patiënten motiveert om te komen), dan kunnen deze zaken op termijn ook risicofactoren vormen voor behandeltrouw. Eerder onderzoek stelt dat behandeltrouw vaak wordt beïnvloed door te optimistische verwachtingen van patiënten over het verloop van een behandeling (Swift & Callahan, 2009). Het verschil tussen deze verwachtingen (bijv. snel herstel en daarmee dus een meer directe behoeftebevrediging) en de daadwerkelijke effectiviteit van een behandeling (het kost tijd en inzet om gedrag te veranderen en het duurt dus even alvorens men daadwerkelijk wordt beloond), zorgt ervoor dat patiënten vroegtijdig de behandelingen stoppen. Impulsieve patiënten met een aversie voor wachten lopen daarmee dus het risico uit te vallen als ze ervaren dat het behandeltraject 'te lang' duurt. 'Pretherapie' technieken, zoals het van tevoren bespreken van verwachtingen en misvattingen over behandeling kan in sommige patiëntengroepen helpen om dit te voorkomen (Ogrodniczuk, Joyce, & Piper, 2005). Om de behandelmotivatie gedurende het gehele traject te verhogen, kan in therapie ook op zoek worden gegaan naar meer constante directe beloningen en stimulerende manieren om de sessies vorm te geven. Plannen en objectiveren van verschillende gedrags- en psychosociale veranderingen die helpen om de uiteindelijke behandeldoelen van patiënten te bereiken, en het identificeren en vieren van de kleine stappen op weg hiernaartoe, kunnen ook voortdurende motivatie stimuleren. Een andere strategie is ontwikkeld in een meta-cognitieve therapie voor (niet-forensische) patiënten met ADHD (Solanto et al., 2010), waarin patiënten leerden om de langere-termijn beloningen die ze hopen te verkrijgen door het volgen van therapie te mentaliseren, en vervolgens te visualiseren als ze in het hier en nu oefenen met alternatief gedrag. Deze strategie beoogt het belang van de langere termijn doelen te verhogen en op deze manier actieve inzet in het hier en nu te stimuleren (Solanto, Surman, Ma, & Alvir, 2018). Meer onderzoek is nodig om te bepalen in welke mate ADHD-symptomen en onderliggende cognitieve en motivationale beperkingen samenhangen met responsiviteit in behandeling van forensische patiënten over tijd. Met behulp van deze strategieën kunnen therapeuten en onderzoekers echter proberen

de inzet van patiënten effectief te bekrachtigen en voortdurende behandelmotivatie verder te stimuleren.

Conclusie

In overeenstemming met eerder onderzoek laat dit proefschrift zien dat mensen met minder zelfregulatie een verhoogd risico hebben op delict- en ander probleemgedrag. Interpersoonlijke factoren, zoals onveilige hechtingsstijlen, kunnen dit risico in forensische patiënten met ADHD, jongeren en mannen uit de algemene populatie verhogen. Er zijn geen aanwijzingen gevonden voor de beschermende rol van interpersoonlijke factoren in dit verband. Persoonlijke risicofactoren voor delictgedrag in patiënten met ADHD, zoals bijkomstige gedragsproblemen en cognitieve en motivationele beperkingen, hingen samen met medewerking in wetenschappelijk onderzoek en behandeltrouw bij forensische patiënten met ADHD. Interpersoonlijke factoren, waaronder de door patiënten gerapporteerde kwaliteit van vriendschaps- en familierelaties, sociale steun en hechtingsstijlen, beïnvloedden deze zaken niet. Toekomstig onderzoek naar de wijze waarop interpersoonlijke problemen in forensische patiënten met ADHD tot uiting komen in hun (dagelijkse) interacties met belangrijke anderen, is echter nodig om meer diepgaande conclusies te trekken over de wijze waarop deze factoren bijdragen aan het risico en de responsiviteit in behandeling van patiënten. Meer onderzoek naar de specifieke rol van ADHD-symptomen en behandelmotivatie binnen de forensische psychiatrie lijkt een andere noodzakelijke stap om patiënten blijvend en op de juiste manier in hun behandeltraject te kunnen ondersteunen.

About the author

ABOUT THE AUTHOR

Jenny Adriana Beatrix Maria Houtepen was born on February 12, 1991 in Goirle, The Netherlands. After finishing high school at the Mill Hill College in 2009, she started a Bachelor in Psychology and Health at Tilburg University. During her Bachelor studies, she participated in the Excellence Program of the Tilburg School of Social and Behavioral Sciences and worked as a teaching-assistant at the department of Methodology and Statistics. In 2012, Jenny graduated with distinction and continued her education in the master Forensic Psychology at Tilburg University. After she completed her master's degree cum laude in 2013, she started working as a junior researcher on a European study on cybercrime, at Tilburg University. In 2014, she became a PhD-student at Fivoor Research and Treatment Innovation and the Developmental Psychology Department of Tilburg University. Simultaneously, Jenny worked as a clinical practitioner at a forensic outpatient center of Fivoor in Rotterdam. As a therapist, she has mainly been involved in the treatment and diagnostics of forensic adult patients with Neurodevelopmental Disorders. Currently, Jenny is continuing her clinical education by following the post-master's Healthcare Training program ('GZ-opleiding') at Fivoor in collaboration with GGz Breburg.

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Dankwoord

DANKWOORD

"Tell me, what is it you plan to do with your one wild and precious life?"
- Mary Oliver

Prinses worden wilde ik eerst, maar in groep 4 van de basisschool heb ik die ambitie laten varen. Psycholoog werkend in de forensische psychiatrie was het volgende op mijn lijstje. Leren over wat mensen beweegt tot het vertonen van crimineel gedrag en hoe je dit gedrag in behandeling kunt verminderen, dát klonk tof. Dus zo geschiedde. Dat deze plannen uiteindelijk zouden resulteren in het doen van onderzoek naar, en het schrijven van een proefschrift over dit onderwerp, was niet gepland. Soms loopt het allemaal net even anders. En anders lopen, dat doet het tijdens het schrijven van een proefschrift zeker. Vaak ook, frustrerend is dat. Maar nu, terugblikkend aan het einde van de lange rit, had ik het niet nóg anders gewild. Mijn proefschrift is af en daarvoor veel dank aan iedereen die mij hier op een bepaalde manier bij heeft geholpen, de volgende mensen in het bijzonder.

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Patients with Attention-Deficit Hyperactivity Disorder (ADHD) are at increased risk for offending. ADHD is a heterogeneous disorder characterized by symptoms related to impulsivity, sensation seeking, and deficits in attention and reward systems. Forensic patients with ADHD often report comorbid psychiatric problems, psychosocial impairments, and high problem severity. These problems may further increase the risk for (re)offending and negatively affect treatment responsivity. More knowledge on factors associated with (re)offending risk and treatment responsivity in forensic patients with ADHD can help decrease problem behavior and foster effective treatment. In the studies in this dissertation, it was therefore examined how interpersonal risk and protective factors relate to offending behaviors in forensic patients with ADHD and in youth with self-regulatory problems. Moreover, (inter)personal risk and responsivity factors associated with treatment and research compliance were examined in forensic patients with ADHD.